



RESIDENTIAL AND  
CIVIL  
CONSTRUCTION  
ALLIANCE OF  
ONTARIO

An Independent Study Commissioned by

**RCCAO**

**Constructing Ontario's Future**



Credit: Metroix



## Financing Roads and Public Transit in the Greater Toronto and Hamilton Area

January 2013


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Commissioned by the  
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## EXECUTIVE SUMMARY

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The Greater Toronto and Hamilton Area (GTHA) is widely regarded as the foremost economic powerhouse in Canada. Businesses locate in the GTHA for access to a highly qualified workforce, business services, transportation, and communications networks. To maintain its prominent economic position, the GTHA must exploit its strengths and remedy its weaknesses. Especially critical is the availability and quality of efficient public transit and road systems. Increasing traffic congestion and pollution are growing concerns. If bridges, highways and public transit systems are not maintained, liability will become an issue, too. The GTHA has ambitious plans to address these problems by expanding and improving transit service and roadway infrastructure. It will need some \$50 billion to pay for The Big Move, Metrolinx's transit plan. Considerable sums will also be required to operate the enhanced transit system so that it delivers high-quality service to users over its lifetime. There is a large gap between the funds available and the costs of financing and funding these plans. New sources of revenue will be necessary.

Additional investments will not guarantee a high-quality transportation system unless the system is appropriately used. Without efficient pricing of public transit and roads, users will not make appropriate decisions about how often to use it, where to live and work, and so on. This report develops recommendations on how to raise money to fund transportation investments while also improving how transportation infrastructure and services are used.

Currently, public transit and roads in the GTHA fall well short of correctly structured pricing.

Public transit fares are inefficiently designed in several ways. First, with the exception of GO Transit, fares do not vary systematically with distance traveled. This inefficiency encourages urban sprawl because people can live far from work and commute by transit at low fares. Flat fares also discourage people from using transit for short trips, and this low demand makes it difficult to justify expanding service to nearby suburbs. Second, fares do not vary with time even though ridership and crowding fluctuate predictably throughout the day and week. Failing to charge higher fares during peak hours can result in over-investment in public transit infrastructure. Finally, transit is mainly a local responsibility in the GTHA which makes it difficult to integrate service throughout the region and to implement distance-based fares. The GTHA should adopt a more efficient and integrated fare structure.



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**Recommendation 1:** Transit fares should be based on distance traveled and time of use. A zonal scheme with peak/off-peak fare differentiation would be a reasonable compromise between strict adherence to marginal-cost pricing rules and ease of comprehension and use for riders. Implementing such a fare structure would be facilitated with the Presto fare-card system. Average transit fares should not be increased unless, perhaps, road pricing is introduced along the same travel corridors or on a wide scale.

Automobile usage in the GTHA is even less efficiently priced than transit. On-street parking in high-demand areas is often priced well below its scarcity value, while privately owned garage parking is sometimes overpriced. Both price distortions encourage drivers to search for cheap but scarce parking spots. This wastes their time, and also impedes through-traffic. Parking space is controlled by various regulations, but they are costly to enforce and have some adverse side effects.

**Recommendation 2:** On-street and off-street parking fees should be restructured to support more efficient usage of parking space. On-street parking fees should be based on occupancy rates in order to minimize time spent searching for parking while maintaining reasonably high utilization rates of parking space. Maximum-stay regulations should be replaced by escalating hourly rates in order to encourage parking space turnover while minimizing inconvenience on parkers and effort devoted to enforcement and fine administration. The Toronto Parking Authority can implement such measures within the City of Toronto. To control risks, implementation could begin with a limited-scale trial with expansion to follow conditional on successful experience.

Two parking-related instruments can be used to raise money from parking directly: commercial parking sales taxes and parking levies. The GTHA does not currently have a commercial parking sales tax. A parking levy is a special property tax that is applied to non-residential, off-street parking space. A tax on commercial property was introduced in the Greater Toronto Area in the early 1990s to fund public transit and roads. It did not function as planned, and it was repealed after three years. However, the problems could be alleviated by designing and operating the levy judiciously. Parking levies are flexible in scope and rate structure, and they do not require parking activity to be recorded. They also have a large revenue potential.

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**Recommendation 3:** The GTHA should consider implementing either a commercial parking sales tax or a parking levy. Responsibility for either measure could be granted to each municipality in the GTHA, or to the two cities and four regions in the GTHA, or to a governing body such as Metrolinx. However the commercial parking sales tax or parking levy is administered, tax rates or levies should be coordinated to avoid significant differences between municipalities that would encourage wasteful diversion of traffic and parking activity across municipal boundaries to take advantage of lower rates.

Like parking, usage of roads while traveling is inefficiently priced. A large fraction of the costs of vehicle ownership are fixed and do little to constrain usage. Fuel taxes are a crude form of user charge, but they are a blunt instrument for tackling congestion which varies greatly with location and time of day. Tolls are a much more effective instrument for targeting congestion and they can also be used to charge for road damage and pay for infrastructure. Tolls are scarce in Canada, and Highway 407 is the only tolled facility in the GTHA. Yet road pricing is widespread in other countries and it has been implemented in various forms.

**Recommendation 4:** Road pricing using time-varying tolls is the most attractive funding scheme for the GTHA in terms of adhering to the user-pay principle, economic efficiency, consistent and sustainable revenue yield, and equity. The two most promising options are: (1) a network of high-occupancy toll lanes, and (2) tolling all lanes on 400-series highways and possibly major regional and municipal roads. Both options should be energetically pursued. HOT lanes are the smaller-scale and less-risky option, but it will take time to build out the network. HOT lanes also have less revenue potential than more broadly-based road pricing schemes. Tolling highways should begin either after part of the HOT lane network is up and running, or at the same time.

In combination, reform of transit fares and parking pricing, a regional parking tax or levy, and some form of comprehensive road pricing might yield enough revenue to fund The Big Move. If not, one or more other funding instruments will be needed. A number of possibilities are reviewed in this report. The leading candidates appear to be a regional fuel tax, a vehicle levy, and a regional sales tax. A fuel tax is ideal for internalizing the costs of greenhouse gas emissions, but it is a blunt instrument for controlling congestion. However, this should not be a limitation if efficient pricing of parking and roads is introduced. A



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vehicle levy is simple to collect and administer, and the City of Toronto has experience with the recent Personal Vehicle Tax. A vehicle levy throughout the GTHA would raise several times the revenue. The main strengths of a regional sales tax are its large revenue potential and the fact that it is paid by commuters and visitors as well as residents. Because of its broad base, and the relatively low level needed, a sales tax could be seen as a fair way for everyone to contribute toward a good regional transportation system.

**Recommendation 5:** Consideration should be given to implementing a regional fuel tax and/or a vehicle levy and/or a regional sales tax in the GTHA. The governing body would be responsible for setting the rate and spending the revenues. To reduce costs, a collection and administration levy could be piggybacked onto the corresponding existing tax.

Gaining public and political support to introduce new funding instruments and expand existing ones is essential for any plan to succeed. Experience around the world offers several lessons. One is that any scheme should have a clear and publicly stated objective. Pursuing multiple objectives is attractive from a system optimization perspective, but it is liable to create confusion. A second lesson is that the public should be engaged at all stages of implementation through consultation, focus groups and other media. While he was mayor of London, Ken Livingstone played a key role in implementing the London Congestion Charge, demonstrating that a political champion is helpful for bringing in controversial measures. A third lesson is that revenues should be dedicated to local transportation. Good public transit is considered highly desirable – if not essential – if measures are introduced to make driving or owning vehicles more expensive. The fact that public transit investments form the lion's share of The Big Move is a major plus.

**Recommendation 6:** A funding plan should be designed and presented to the public with simple, consistent objectives. The revenues should be dedicated to specific projects and ring-fenced in such a way that other revenues are not reduced in an offsetting manner. To the extent possible, public transit investments should be expedited, and the effects on modal shares and travel times measured regularly and conveyed to the public to demonstrate progress.

**See Appendix A for a summary assessment of revenue instruments.**

## Acknowledgments

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This report is a sequel to the 2008 RCCAO report by Harry Kitchen entitled Financing Public Transit and Transportation in the Greater Toronto Area and Hamilton: Future Initiatives. That report identified a number of new financing tools. When it was released, the report prompted a fair amount of controversy, some favourable and much unfavourable. In the intervening five years, a number of developments have highlighted the urgency of moving forward on new financing tools for roads and public transit in the GTHA. These developments include growing concerns over the costs of traffic congestion in lost time and reduced economic productivity; a variety of reports and studies calling for investments in the interregional road and transit systems; newspaper articles and editorials calling for new financing tools including road pricing; and a gradually increasing acceptance by the general public that some form of road pricing should be implemented.

This new report emphasizes road pricing as well as parking measures as attractive financing instruments because of their efficiency and other generally desirable properties. Road pricing has progressed in Canada with the introduction of tolls on the Autoroute 25 expressway linking Laval and Île de Montréal, as well as tolls on the Golden Ears Bridge and the new Port Mann Bridge in Vancouver.

Thanks to Metrolinx for supplying the photo of the new pedestrian bridge in Pickering spanning Highway 401. This bridge will link the GO station on the south side with the Pickering Town Centre, a new office tower and a 500-vehicle GO Transit parking structure on the north side of the highway. The remaining three cover photos were purchased by RCCAO through iStock.

## 1.0 INTRODUCTION

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In a world in which globalization is becoming increasingly important as a driver of Canada's economic activity, governments at all levels have a responsibility to adopt policies that improve productivity and expand business activity. Nowhere is this more important than in Canada's largest metropolitan area. This area is referred to as the Greater Toronto and Hamilton Area (GTHA). It encompasses two single-tier cities (Hamilton and Toronto) and four two-tier regional governments (Durham, Halton, Peel and York) with 24 lower-tier cities, towns, and townships that are part of the regions. With a population of roughly seven million people (more than half the provincial total), it is widely accepted that the GTHA is the chief economic powerhouse in Canada. The region is estimated to generate nearly 20% of Canada's gross domestic product (GDP) and 45% of Ontario's GDP, and it is home to 40% of Canada's business headquarters.<sup>1</sup>

Given the importance of the GTHA as an economic driver, it is vital that business and industries are able to thrive in the ever-expanding and increasingly competitive global economy. Growing and expanding businesses engaged in national and international activities locate in the GTHA because they have access to a highly qualified workforce (knowledge workers) as well as business services, transportation, and communications networks.<sup>2</sup> By financing and providing public services, municipal governments play an important role in attracting and retaining these businesses.

The quality and availability of efficient public transit and road systems is especially critical for the GTHA. Indeed, these systems are essential if economic growth, productivity, and international competitiveness are to improve.<sup>3</sup> Along with increasing traffic congestion, environmental degradation caused by air pollutants and emissions of greenhouse gases (mainly carbon dioxide) are growing concerns. If bridges, highways and public transit systems are not properly maintained, liability will become an issue, too.

The GTHA faces two challenges in providing a first-class public transit and road system. One is to determine how to fulfill the region's plans for new investments in transit service and roadway infrastructure. The other is to run the enhanced system so that it delivers high-quality service to users over the long term. Additional money is needed to achieve each objective. Financing is required to build new infrastructure, and sustainable funding is required to operate and maintain it. Funding is also needed to pay back any debts incurred at the financing stage, such as interest and principal on bonds used to finance a transit expansion. The terms financing and funding are often used interchangeably, but they refer to distinct concepts. Some revenue instruments may be suitable for both financing and funding, while others are more appropriate for one or the other. It is also important to recognize that financing and funding requirements are related. First, if investments are financed by bonds or other forms of debt, funding obligations will grow. Second, new infrastructure will require funding for ongoing operations and maintenance,

1 OECD (2009).

2 Conference Board of Canada (2011).

3 Transport Canada (2006a).

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and eventually possible rehabilitation or even reconstruction. Therefore, financing and funding should not be treated as separate problems. That said, the distinction between financing and funding is not considered in this report when evaluating revenue instruments.

### **1.1 Responsibility for major roads and public transit in the GTHA**

Each city, town, and regional government in the GTHA is responsible for local public transit and most roads and highways within its boundaries. The Province is responsible for 400 series highways (except for Highway 407 which is privately owned) and GO Transit, which crosses the regions and cities in the GTHA.

In response to widespread concerns over problems (congestion, quality of life, social and environmental costs, and so on) created by the lack of an integrated transportation system across the GTHA, the Government of Ontario in 2006 created the Greater Toronto Transportation Authority (GTTA) which became known as Metrolinx in December 2007. The GTTA “was given the mandate to develop and implement an integrated multi-modal transportation plan for the GTHA.”<sup>4</sup> In 2008, Metrolinx produced a Draft Regional Transportation Plan (DRTP) designed to address traffic congestion in the GTHA and to provide a more sustainable regional transportation network up to 2031. The DRTP “combines large-scale investment in transit service and roadway infrastructure, along with traffic demand management initiatives and sustainable transportation improvements.”<sup>5</sup> In particular, the plan referred to as The Big Move calls for the construction of 1,200 kilometres of rapid transit which will approximately triple existing services.<sup>6</sup>

Financing this plan will not be easy. The project is estimated to cost \$50 billion in capital over 25 years and approximately \$1.5 billion in annual operation and maintenance costs.<sup>7</sup> There is a large difference between these costs and the funds that the Province has so far set aside for these projects. When this challenge is combined with the size of the provincial deficit and the accumulating provincial debt, it seems unlikely that current provincial revenues will be sufficient to provide adequate financing<sup>8</sup>. Revenue sources currently available to municipal governments are not sufficient to finance these projects either. New sources of revenue will be necessary – a point that was emphasized by Dwight Duncan, Ontario’s outgoing provincial treasurer, in a recent interview with the Toronto Star.<sup>9</sup>

4 Metrolinx (2008a, p. iv).

5 HDR (2008, p. 25).

6 Metrolinx (2008b).

7 Metrolinx (2008b).

8 This report does not address whether all components of The Big Move are worth implementing.

9 Cohn (2013)

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## 1.2 Infrastructure gap or deficit

Over the past two decades, much has been written on the size of the so-called infrastructure deficit or gap.<sup>10</sup> These reports and studies, by and large, have been national or provincial in their coverage. Most have considered a wide range of physical infrastructure, but a few have focused on a single asset such as water and sewer, public transit, or roads and bridges. None, however, has focused on roads and transit for the GTHA only, so we don't really have a solid grasp of the size of the infrastructure deficit in this metropolitan area. The studies all conclude that there is an infrastructure deficit, and although the size of the deficit varies widely from report to report, it is reasonable to infer that a deficit exists for a metropolitan area such as the GTHA.

These estimates, however, have at least four flaws. First, most are based on information collected from surveys that are administered by associations – water and wastewater operators, public transit systems, municipal engineers – whose respondents have an incentive to include their “wish list” as being equivalent to needs, especially if they perceive or believe that the larger the list and the larger the deficit, the greater the likelihood of provincial and federal grant assistance.

As well, even where a benchmark or standard has been set for determining needs, it is often set by the association representing the asset or assets, once again creating an incentive to set high standards or benchmarks if there is a possibility that it could lead to increased grants and investment. Furthermore, these standards or benchmarks are almost always based on engineering standards, and do not include serious economic reasoning or assessment based on economic performance.<sup>11</sup> This distinction is important because engineering standards rely on technical measures of conditions and needs for development and spending, and not on economic performance that should include an analysis of why the need came about or what caused it. It is important to assess whether the deficit is due to an asset management problem, a pricing problem, or something else.

A second flaw in infrastructure deficit estimates is that views and estimates often differ on the amount of upgrading or rehabilitating that is required to bring the quality of the asset up to a certain standard, regardless of how the standard is set. Although technical in their approach, assessments of engineering needs have subjective elements when they determine current quality and what is required to rehabilitate or repair an asset to meet specific standards.

Third, there is no consistency or clarity in how infrastructure needs, and their resulting impacts on deficits, are estimated. In some cases, it has been left to individual respondents to determine their needs without referring to a generally accepted provincial or national standardized benchmark. In other cases, respondents have determined their needs by

<sup>10</sup> For a review of many of these studies and reports, see Kitchen (2003) and RCCAO (2006).

<sup>11</sup> Kitchen (2003).

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comparing their existing infrastructure with what it would be if it met national or provincial standards or benchmarks. Furthermore, where shortfalls have been identified, they have been based on an assumption that existing taxation/pricing policies for the services provided by the assets will continue rather than on an estimate of what the need would be if more effective demand management and conservation-based pricing policies were implemented.

Fourth, studies that take some past infrastructure spending measure (capital stock per capita or per thousand dollars of GDP or something else), perhaps 25 or 30 years ago, as the base for deriving the current infrastructure deficit must also be treated with caution. These studies and reports estimate the current infrastructure gap as the difference between today's current stock of public infrastructure and what it would have been if the measure from 25 or 30 years ago had increased at the rate of population growth, or inflation, or GDP or some combination of these. In other words, the size of the gap depends on the starting point (year).

In short, one cannot derive any solid conclusions about the size of the infrastructure deficit in Ontario or the GTHA. In any case, it may not matter. There is little to be gained from dwelling on what has happened. More relevant are the decisions to be made now and in the future. It is becoming increasingly clear that decisions to spend on roads and public transit infrastructure should not be undertaken until three significant changes are made. First, the services provided by this infrastructure must be priced efficiently. Second, all costs must be reported and included in pricing/taxation structures. And third, asset management programs need to be clearly articulated and implemented.

Efficient pricing is particularly important. In the absence of correct prices for roads and public transit, users have no idea how much the service actually costs and no incentive to make efficient decisions about how often to use it, where to live and work, and so on. Failure to set correct prices is also likely to cause over-investment where the service is underpriced and under-investment where it is overpriced.

Correct pricing is important because it provides information to both consumers and suppliers that will lead to more efficient infrastructure investment decisions and levels of service. Currently, public transit and roads in the GTHA fall short of correctly structured prices in at least two ways. First, user fees need to be expanded. For example, road tolls, more efficient parking fee structures and other road-user charges could be implemented. Second, public transit fares are inefficiently designed. In particular, except for GO Transit, municipal fares seldom depend on distance traveled. As Gillen (2001) argues, prices serve as an invaluable mechanism for revealing the true demand for public infrastructure, and consequently how much of it should be supplied. There is a disconnection between user payments and services provided by specific infrastructure assets. It has led to too much public capital in some sectors and too little in others.



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### 1.3 Cost of congestion in the GTHA

Traffic congestion and environmental pollution are serious and growing problems in the GTHA. According to Metrolinx (2008a), more than two million automobile trips are made daily in the peak morning travel period in the GTHA, with this number expected to rise to three million by 2031. Traffic congestion increases the cost of the region's transportation activities and has a negative impact on the region's economy. The principal social and economic costs of congestion are attributed to the costs of reduced output and accompanying job losses; costs of travel delays and unpredictable travel times; costs associated with retiming of trips to avoid severe congestion; higher vehicle operating costs associated with higher traffic volumes; local and global environmental costs of vehicle emissions; and social and economic costs of more frequent traffic accidents.

Soberman et al. (2006) put the loss from congestion and shipment delays in the GTA (Hamilton excluded) at about \$2 billion annually. Another study put it at \$2.2 billion in 2001, rising to more than \$4 billion by 2031 if something isn't done.<sup>12</sup> Transport Canada (2006a) organized a study that estimated the costs of travel delay, additional fuel consumption, and greenhouse gas emissions due to congestion for the nine largest urban areas in Canada. Montreal and Toronto accounted for about 70% of the total cost of approximately \$3 billion annually. In per capita terms, Toronto came out highest at \$270 and Hamilton lowest at \$17. These figures, however, did not include all costs. They excluded the costs of "accidents, noise, local emissions, road damage, and behavioural adaptations to congestion."<sup>13</sup> Transport Canada (2006b) issued a follow-up report that added the estimated costs of so-called "nonrecurrent congestion" due to stalled vehicles, accidents, truck spills, bad weather, construction, and seasonal maintenance. Doing so nearly doubled the estimated total annual costs to \$5.58 billion. If the remaining costs of congestion could be quantified, the total would be higher still.

HDR (2008) completed the most recent study on congestion costs in the GTHA. It estimated that, in 2006, congestion imposed an annual cost on commuters of \$3.3 billion, and a cost to the economy in terms of lost output (i.e., reduced GDP) of \$2.7 billion. Furthermore, the study forecast that if nothing is done to improve the transportation system, by 2031 the annual congestion cost would increase to \$7.8 billion for commuters, and to \$7.2 billion in lost economic output.

Finally, two recent surveys concluded that Toronto's congestion, while still high, was less severe in 2012 than in 2011.<sup>14</sup> This decline, the authors note, was attributed to a decline in economic activity and not to a more efficient use of the roads and transit network. The authors also concluded that when economic activity starts to grow again,

12 Toronto City Summit Alliance (2007, p. 10).

13 Lindsey (2007, p. 6).

14 Reported in Coyne (2012) and Taylor (2012).

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road congestion will become much worse. These conditions, along with the costs associated with congestion, are unacceptable – something must be done and it must be done soon! Stalled or postponed new initiatives will lead to higher congestion costs and lower levels of economic activity.

#### **1.4 Goals of this report**

This report has two primary goals. First, it provides guidance on the revenue tools that should be considered and how these might be implemented – allowing for governance considerations – in order to finance and fund an improved roads and public transit network. Second, it supports efforts for a more informed public discussion about the appropriate means of paying for this improved system, and supports Metrolinx’s goal of developing an appropriate investment strategy.

#### **1.5 Outline**

The report is organized as follows. Part 2 provides the principles for evaluating a range of financing mechanisms. Part 3 covers current municipal revenue tools. Part 4 examines commercial parking sales taxes, parking levies and parking fees. Part 5 looks at road pricing, and Part 6 considers other revenue instruments. Part 7 concentrates on governance issues. Finally, Part 8 provides recommendations for the GTHA.

## 2.0 PRINCIPLES FOR EVALUATING FINANCING MECHANISMS

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It is generally agreed that the “benefits-based” model of intergovernmental finance<sup>15</sup> is the most appropriate framework for evaluating municipal finance options. The underlying principle of this model<sup>16</sup> is straightforward: those who benefit from local infrastructure and the services it provides should pay for it. The benefits-based model is particularly important because it satisfies the following public finance or taxation criteria or principles, and sets the stage for good governance<sup>17</sup>: efficiency which will lead to effective signaling; accountability and transparency; consistent and sustainable revenue yields; ease of administration; and fairness and equity. Each of these is defined here with ease of implementation added as another criterion.

**Economic efficiency** is achieved when the user fee or price per unit of output equals the extra cost of the last unit consumed. This is the price-equals-marginal-cost pricing principle. Charges or prices applied in this way are efficient for funding services where the beneficiaries can be clearly identified and the costs correctly derived. Correctly set prices, in turn, send signals to policy makers about the optimal level and quality of service desired.<sup>18</sup>

**Accountability** is best achieved where there is a close link between the use of a service and the price or charge paid for its use.

**Transparency** is achieved when users have access to information about the way in which the price or charge is set, and the way in which expenditures are made.

**Consistent, sustainable revenue yields** are essential. A revenue source should be consistent in the sense that the yield does not fluctuate with the business cycle or other unforeseeable events. A revenue source should also be sustainable in that it does not shrink over time because of changes in technology or behaviour. Finally, a revenue source should produce a large yield.

**Ease of implementation:** A new revenue source should be technically feasible and economic to implement. The time and cost involved in implementation depends on whether new or unfamiliar technologies are required; whether legal barriers have to be overcome; whether new departments or institutions need to be set up; whether new communication links between existing institutions need to be established, and so on.

15 Kitchen (2006, 2008).

16 Duff (2004), Kitchen (2011).

17 Kitchen (2008), Lewis and Tomaszewska (2011) and Litman (2012b).

18 Lewis and Tomaszewska (2011) refer to this virtue as good governance.

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*Ease of administration* is desirable for any revenue source. It should be economical to operate, and also simple for users or taxpayers to understand and comply in terms of payment or adherence to regulations.

*Fairness or equity* has horizontal and vertical dimensions. Horizontal equity is satisfied when individuals in similar situations are treated equally. Vertical equity concerns how individuals with different income levels or privileges are regarded. Horizontal equity is achieved when those who consume public services pay for them, just as someone benefits from purchasing milk or a movie ticket. Concern about the burden on lower-income individuals is important, but it should not be addressed by altering or distorting the price or charge for a service. Doing so undermines economic efficiency as defined, and it raises the cost of administration. Furthermore, subsidization often benefits the rich more than the poor. Instead, vertical equity concerns should be addressed through income transfers from provincial or federal governments and social assistance programs targeted to individuals in need. In addressing horizontal or vertical equity it is important to consider not only how services are priced, but also how the revenues are used. For example, it may be possible to promote vertical equity by rebating a portion of revenues to lower-income households on a lump-sum basis.

Municipal governments in Ontario provide and fund services that range from those that have “private goods” characteristics (water, sewer, solid waste collection and disposal, for example) to those with “public goods” characteristics (fire, police, local streets, neighbourhood parks). Private goods are those where specific beneficiaries can be identified, individuals can be excluded, income redistribution is not a goal, spillovers are few, and all operating and capital costs are measurable including the “full cycle” cost of facilities and services over time. Furthermore, each user can be charged for the quantity consumed and it is appropriate to do so.

Local public goods are those that generate collective benefits to the entire community or neighbourhood, and income distribution may be more of a concern. For example, the benefits from local roads, neighbourhood parks, and fire and police protection accrue to everyone in the neighbourhood or community rather than certain people. These services, then, should not be funded by specific charges or user fees. Rather, they should be funded by local taxes with partial financial support from neighbouring municipalities or the region to capture the cost portion of the service that provides spillover benefits to neighbouring jurisdictions.

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In between are services that have a mix of private and public good characteristics. These include major roads, highways and public transit, to name those of interest for this report. Here, financing should be based on the theory of “second-best.”<sup>19</sup> Currently, road and expressway users pay nothing to local governments for each trip taken<sup>20</sup> while transit users are either charged for each trip or for passes with limited time duration. It would be efficient and fair to charge public transit users fares that cover the full cost of public transit only if car and truck drivers paid their full cost (capital and operating costs of roads plus congestion and environmental damage). Since such road charges do not yet exist, full-cost pricing for public transit is not efficient or fair. Efficiency can then be enhanced through the second-best solution of subsidizing local public transit.

A “first-best” pricing policy is to impose charges that control road use. Revenues from these charges could be used to fund both roads and public transit systems. Critics of this approach often argue that road charges hurt the poor. This criticism is largely unfounded because poorer people use roads less than richer people while relying more heavily on local public transit. With road pricing, buses would speed up because of fewer cars on the road, and service would be further enhanced if the revenues from tolls were used to improve public transit.<sup>21</sup>

19 Boadway (1997).

20 They do, however, pay costs incurred in operating their vehicles plus provincial and federal fuel and excise taxes, and registration fees.

21 Lindsey (2007).

## 3.0 CURRENT MUNICIPAL REVENUES

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This section covers three types of revenue-generating instruments that are currently used by municipalities in the GTHA for funding roads and transit: property-related taxes and charges, transit fares, and infrastructure funds. The description and analysis of these revenues is considerably shorter than the discussion of potential revenue sources in Sections 4, 5, and 6 primarily because the current tools have already been described and evaluated in a variety of other studies that are referenced below.

### 3.1 Property-related taxes and charges

Various property-related taxes and charges are used to finance all, or a portion, of municipal operating and capital costs of roads and public transit across the GTHA. These include general property taxes, development charges, special assessments, value capture levies, tax increment financing, and land transfer taxes. Most of these have a distinct role and each is discussed briefly.

#### General Property Taxes

Property taxes are the major source of operating revenue for municipal governments in Canada, and the only tax of any note that municipalities may levy. For the GTHA as a whole, property taxes represent slightly more than 45% of all municipal revenues; user fees and grants account for a further 20% each; and a miscellaneous array of fees, permits and charges account for the remaining 15%.<sup>22</sup> Property taxes finance a range of municipal services in the GTHA and elsewhere in Ontario.

The strongest economic and fiscal arguments for assigning a tax or taxes to municipal governments come from the literature on fiscal federalism where there is widespread agreement on general principles that should be followed. The best municipal/local taxes are those that have the following characteristics. They are based on an immobile tax base, and therefore borne primarily by local residents (not exported). They do not create problems with harmonization or harmful competition between local governments or local governments and more senior levels of government. They generate sufficient, stable and predictable revenues. They are visible to ensure accountability and transparency. They are perceived to be fair. They are easy to administer locally.<sup>23</sup>

The real property tax meets these criteria better than any other tax. Its base is largely immobile. Revenue is generally predictable and stable in that it does not vary with the cyclical swings in economic activity as much as personal income and consumption-based tax revenues. The part of the tax that is on residential property is unlikely to be exported. It is highly visible and fair as long as it covers the cost of providing those services that provide collective benefits to the local community. If the property tax is a local tax only

<sup>22</sup> Kitchen (2013a).

<sup>23</sup> Bird and Slack (2004), Bird and Bahl (2008), Kitchen and Tassonyi (2012) and Kitchen (2013b).



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(senior levels of government not involved), harmonization problems and wasteful tax competition should not be a problem. A potential downside of a local property tax is that it may be more expensive to administer than other local taxes (income, sales, fuel, for example) that could be piggybacked with existing federal or regional taxes.<sup>24</sup> This, however, may be a small price to pay if local governments are to have autonomy and flexibility in setting tax policy – important ingredients of responsible, efficient and accountable local governments.<sup>25</sup>

In the GTHA, property taxes fund most of the operating costs of roads and a portion of the operating costs of public transit, except for GO Transit. At the same time, they often fund a portion of capital costs of assets which have a short life expectancy (road maintenance vehicles and transit buses, for example) and they fund some relatively small recurrent capital expenditures (maintenance and upgrading of sidewalks, local roads and street lighting). Under the benefits-based model of municipal finance, it is appropriate that the property tax be used in this way because it funds services that provide collective benefits to the local community and generally meets the principles laid out in Section 2 and reviewed in the preceding paragraph. For assets with a long life expectancy including bridges, major roads and highways, and transit systems, property tax funding is likely to be inappropriate because current taxpayers will fund projects that benefit future users – a violation of intergenerational equity.<sup>26</sup>

As to whether or not property taxes could be used more extensively for roads and transit in the GTHA, they probably could be. There is no “a priori view” on the optimal level of property taxes for funding these services. Increasing their use may not be desirable, however, especially when there is a variety of other preferred funding and finance instruments. It is these other (and new) instruments that are evaluated in this paper.

### **Development Charges**

A development charge (DC) is designed to recover the off-site cost of capital infrastructure required to service new development or growth. These charges are used by every municipal government and by the boards of education in the GTHA. The charge may include all growth-related costs of infrastructure for water supply, sewage treatment, trunk mains, storm water management, roads and highways, works yards, transit facilities, electrical power facilities, police, fire, land ambulance, recreation, cultural facilities, new schools, general administration, planning studies, rolling stock and equipment, and interest costs (Development Charges Act). DC values in the GTHA are high by Canadian standards; for example, the latest DC for a single residential dwelling for the city, region, and board of education in Mississauga is almost

24 According to City of Toronto (2012, p.7), taxes enabled under the Toronto Act generally cost less than 3% of revenues to collect because they are piggybacked with existing measures.

25 Bird (2001).

26 Bird, Slack and Tassonyi (2012), Kitchen and Tassonyi (2012) and Kitchen (2013b).

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\$55,000. A similar charge for Markham is about \$62,000.

A development charge corresponds best to the benefits-received principle when the costs and benefits of the infrastructure for each property can be determined. An efficient development charge must cover the full cost of delivering the service: a capacity component which covers the capital cost of constructing the facility, plus a location or distance/density charge that reflects the capital cost of extending the service to properties or neighbourhoods.<sup>27</sup>

The most efficient development charges are those that vary by type of property (residential, commercial, or industrial), neighbourhood and distance from source of supply, so that each charge captures the extra cost of the infrastructure required to service the new growth. Most Canadian municipalities, however, do not use variable charges. Instead, they impose identical charges on all properties of a particular type, regardless of location. While administratively convenient, this practice levies the same charge on residential dwellings in low-density neighbourhoods as it does on residential dwellings in high-density neighbourhoods. This occurs even though the marginal cost per property of infrastructure projects in low-density areas is higher, which can lead to urban sprawl.<sup>28</sup> Likewise, levying similar charges on properties that absorb different amounts of resources, due to factors such as terrain or soil type, will encourage development in the wrong places. While it may be naive to expect municipal officials to calculate the infrastructure cost for each new property, costs could and should be calculated for each new development area or neighbourhood, to discourage inefficient patterns of development.<sup>29</sup>

Since development charges are currently used to fund growth-related capital costs of roads and public transit within each municipality in the GTHA, there is unlikely to be any room or any solid analytical argument for increasing these charges to fund more roads and transit.

### **Special Assessments**

Special assessments are common in municipalities in Canada. A special assessment is a specific charge added to the existing property tax to pay for improved capital facilities that border on them. It is justified because these properties derive direct benefits from the infrastructure and are more valuable because of it. The charge is based on a specific capital expenditure in a particular year, but may be spread over a number of years.<sup>30</sup> Projects financed in this way include construction or reconstruction of sidewalks, streets, street lighting, and water mains. These are justified on the grounds that an owner of an abutting property will benefit from the local improvement and should, therefore, help fund it.

<sup>27</sup> Kitchen and Tassonyi (2012).

<sup>28</sup> Slack (2002).

<sup>29</sup> Kitchen (2006, 2013b) and Kitchen and Tassonyi (2012).

<sup>30</sup> Tassonyi (1997).

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Municipalities use several types of special assessments, and the appropriate apportionment depends upon the base for assessment. The most common base, foot frontage of each benefiting property, is appropriate for projects whose cost per property increases with the width of the lot – sidewalks and roads, for example. For projects such as parks, whose benefits accrue to particular areas or blocks within a community, the best approach may be zone assessment, under which all properties in the serviced area pay the same share. Other possible bases for special assessments, such as lot size or charging each property based on its increase in value, are less satisfactory than foot frontage and zone assessments. A sensible approach is to split the cost of improvements that benefit an abutting property and the public at large by charging the bordering properties, for example, 40-60% of the total construction costs, with the municipality raising the balance. The challenge is to match the share assigned to abutting properties with the marginal benefit to those properties.<sup>31</sup>

### **Value Capture Levies**

A value capture levy is designed to recover the increase in land value arising from a public investment. Municipal spending on public infrastructure and subsequent zoning decisions can increase the commercial value of holdings of private landowners. Value capture levies are justified if the public investment creates windfall gains for the private developer. The levy permits the municipality to capture some of the economic rents accruing to the private sector that have been created by this local infrastructure spending.<sup>32</sup>

The value may be captured in a variety of ways, including a requirement that the developer provide various facilities and infrastructure or cash in return for being permitted to undertake the development that the new municipal infrastructure facilitates and makes profitable. Value may also be captured through a tax on commercial revenues generated by property abutting the infrastructure. Alternatively and more likely, a special annual tax on property could be levied on value added.<sup>33</sup> This would be relatively easy to implement and administer, although care would be required in estimating the value added to the property as a result of the public infrastructure.<sup>34</sup> Value capture levies are most suitable for mega-projects such as rapid transit expansion, and there may be room for increased usage of this vehicle in the future.<sup>35</sup>

31 Kitchen and Tassonyi (2012).

32 Merk et al. (2012).

33 Tassonyi (1997).

34 Kitchen (2008).

35 Kitchen and Tassonyi (2012).

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## Tax Increment Financing

Tax increment financing (TIF) is an economic development tool that was originally intended to encourage private investment in urban cores by stimulating downtown revitalization and encouraging brownfield remediation. This, it was argued, would make it easier for the core to compete with suburban and exurban areas, and it would lead to an improved urban quality of life and future tax revenues.<sup>36</sup>

TIFs work in the following way. For a specific period of time (long enough to recover all costs of public funds used to redevelop the property), it divides property tax revenue from the designated area into two categories. Taxes based on pre-developed assessed property values are retained by the municipality for general use. Taxes on increased assessed values arising from redevelopment are deposited in a special increment fund with revenue from this fund used to repay bonds that have been issued to finance public improvements in the redeveloped area. In other words, increases in property tax revenue from the redevelopment of an area are dedicated to financing public improvements in that area.

Supporters argue that there is no transfer of funds from a local government to subsidize a business, nor any transfer of tax dollars from one business to another, because development is financed from increases in the tax revenue that it generates. Unlike bonuses or tax abatements where taxes are reduced or forgiven on a particular property, property owners in a tax increment district (TID) incur the same local tax rate as property owners outside the district. Preferential treatment is granted only in that taxes from the increased assessment base of the TID are dedicated to financing local improvements. Dedicated tax dollars reduce the risk and uncertainty facing the private sector. If used to stimulate downtown development (infilling) or brownfield remediation, TIFs could discourage urban sprawl.<sup>37</sup>

In recent years, TIFs have incurred a fair amount of criticism. They were originally intended for “blighted” areas in urban cores where the development would not take place “but for” the incentive. In recent years, however, the requirement that the area be “blighted” has often been ignored and TIFs have been used in more affluent neighbourhoods and open spaces including farmlands where there is greater potential for property value increases and higher tax revenues.<sup>38</sup> The “but for” test has also been compromised because many developments would have occurred anyway.<sup>39</sup> Finally, TIFs target funds to a designated area and this targeting may be at the expense of areas on the periphery of the TIF district or at the expense of overall municipal growth.

<sup>36</sup> Merk et al. (2012).

<sup>37</sup> Kitchen and Slack (2009).

<sup>38</sup> Youngman (2011).

<sup>39</sup> LeRoy (2008) and Youngman (2011).

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TIFs are widely used in the United States but only sparingly in Canada. In Manitoba, cities are permitted to use TIFs, but do not currently do so. Legislation in Alberta permits municipalities to use a form of TIF known as the “community revitalization levy.” This permits municipalities to impose a property tax on the incremental assessed value of property in a community revitalization area. This revenue is then used to pay for infrastructure and other costs associated with the redevelopment of property in the community revitalization area. Municipalities can issue debentures to cover the costs of redevelopment and use the taxes collected on the increased assessed value to repay the debenture. Ontario municipalities may use tax increment equivalent grants (TIEGs). Under this program, municipalities can designate an area or the entire municipality as a community improvement project area. They can then implement a community improvement plan (CIP) with grants and/or loans which can, if the municipality chooses, be calculated on a tax increment basis. In other words, the municipality can offer developers a grant or loan that is based on the higher property tax that is generated from development.<sup>40</sup> American-style TIFs, however, are only currently allowed for two pilot projects in the GTHA region<sup>41</sup> under the *Tax Increment Financing Act*.

TIFs, if used for revitalization or redevelopment of brownfield sites and downtown cores, may be appropriate in the GTHA but they would only cover very small areas of a few urban centres.

### **Land Transfer Taxes**

A land transfer tax is levied at the time of sale of a property and usually is calculated as a percentage of the value of the property transferred. The tax, which must be paid before the transfer is registered, is like a sales tax. A number of variations on land transfer taxes exist. For example, the tax rate sometimes increases with the value of the property; in some cases, taxes are higher for non-residents.

Land transfer taxes are levied at the municipal level in only Nova Scotia, Quebec, and the City of Toronto. Municipalities in Manitoba are permitted to levy a land transfer tax, but do not currently do so. In Nova Scotia, municipalities can levy a deed transfer tax up to a rate of 1.5%. The Halifax Regional Municipality levies a deed transfer tax at the maximum rate, but not all municipalities in Nova Scotia levy the tax.

A land transfer tax is not a good tax for local governments. It bears no relationship to the benefits received for local services. It imposes a burden on those who buy property while placing no burden on those who remain in their existing property. Not only is this tax unfair in its distributional impact, it reduces house sales and prices and impedes

<sup>40</sup> Kitchen and Tassonyi (2012).

<sup>41</sup> The subway expansion in York Region and the West Don Lands brownfield redevelopment initiative, part of the revitalization of Toronto’s waterfront.

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household mobility.<sup>42</sup> The tax also provides an incentive for those who remain in their houses to demand municipal services knowing that they will be disproportionately paid for by those who buy property.

### **3.2 Transit fares**

Transit fares have several virtues. Fares based on marginal cost pricing are accountable and transparent because they are tied to usage. Transit fare revenues are fairly stable and predictable in the short run. Revenues increase if service is expanded, although financing costs naturally increase, too. Fare revenues are more sustainable than fuel tax revenues (considered in Section 6.1) because they are not as susceptible to technological change. Fares are consistent with the user-pay principle and benefits-based approach to financing municipal services.

Transit fare revenues in the GTHA cover 70-80% of operating costs and a smaller fraction of total costs when infrastructure costs are included. Three general arguments are made for subsidizing public transit service. First, many lower-income households use transit heavily and may not have ready or affordable access to other motorized transportation modes. Second, public transportation has scale economies in route density and service frequency.<sup>43</sup> Marginal-cost pricing then calls for setting fares below average cost. Third, setting affordable fares encourages people to use transit rather than driving which alleviates traffic congestion and other externalities. While buses do create externalities, and passengers crowd and delay each other, the costs are typically much lower per transit user than the equivalent cost per automobile driver. Quantifying these three reasons for subsidizing transit is not an easy task, and it is therefore difficult to say whether transit fares are too high, too low or “about right”, although given the lack of road pricing in the GTHA there is some presumption that fares are too high – as argued later in this section.<sup>44</sup>

The efficiency of transit fares depends not only on their average level, but also their structure. Fares in the GTHA are inefficient in several respects. First, although the social costs of transit trips increase with distance travelled, fares do not vary systematically with distance traveled (except for GO Transit). Short-distance travellers overpay, and long-distance travellers underpay. This is inconsistent with the benefits-received principle, and it creates an incentive for urban sprawl that works against “smart growth” objectives.

<sup>42</sup> Dachis, Duranton and Turner (2008).

<sup>43</sup> Scale economies exist because if ridership increases it is economically worthwhile to add routes and increase service frequency which reduces average access and waiting times as well as uncertainty about waiting time and arrival time.

<sup>44</sup> Parry and Small (2009) conclude that optimal transit fares in Washington, D.C., Los Angeles and London are below 50% of average costs.



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Second, fares do not depend on when trips are taken even though transit ridership and crowding vary predictably by time of day and day of week. Failure to charge higher prices in peak hours creates an incentive to over-invest in public transit infrastructure and to provide greater capacity than can be justified on efficiency grounds. A lack of peak-load charges is often complicated by the availability of quantity discounts. Discounts are used primarily by rush-hour travellers, the practice effectively lowers the price per trip at peak times, when fares should be higher rather than lower. As well, lower fares for seniors, children, and students are difficult to justify – especially at peak times. Subsidies granted on the basis of age or status rather than income are difficult to support on any grounds. Third, several types of transit passes are sold by the Toronto Transit Commission (TTC).<sup>45</sup> Passes economize on transactions costs, but they are generally inefficient with respect to both time of day and distance traveled because the marginal cost of using them is zero during their period of validity.<sup>46</sup>

Further problems in the GTHA are created because public transit, other than GO Transit, is a local (city or region) responsibility rather than an area-wide responsibility. As a consequence, there are weak incentives to achieve positive area-wide results, such as transit-system service integration, integrated seamless/boundary-less fare media, and distance-based transit fares.

One recent innovation in the GTHA is the regional stored-value fare-card Presto system.<sup>47</sup> Smart card technologies help users to determine the fare for a multi-jurisdiction trip, and they reduce the inconvenience of payment. They also facilitate distance and time-dependent fares. The GTHA should consider adopting a more efficient and integrated fare structure. While the implications of such a shift for revenue generation are not transparent, there are two reasons that revenues should rise. First, an easier-to-use system should attract more riders. Second, fare differentiation according to distance and time of travel can boost revenues by exploiting differences in fare-price sensitivity across market segments.

As noted earlier in this section, because automobile usage is underpriced, second-best pricing calls for fares to be set below marginal cost. Operating-cost recovery rates of 70-80% in the GTHA are quite high by North American standards, and fares should probably be lowered rather than raised. Because transit usage is not very sensitive to

45 The Metropass, Weekly Pass, Greater Toronto Area Weekly Pass, Day Pass and Convention Pass ([http://www.ttc.ca/Fares\\_and\\_passes/Passes/index.jsp](http://www.ttc.ca/Fares_and_passes/Passes/index.jsp)). Monthly passes for GO Transit are to be discontinued on January 1, 2013 (Kalinowski, 2012).

46 As Gill (2011) points out, transit passes do serve as a crude form of peak-period pricing since many people who buy them travel regularly at peak times.

47 <http://www.gotransit.com/public/en/fares/prestofaresMay1.aspx>. According to Kalinowski (2012), the cost of creating the Presto system and operating it for 10 years has increased from \$250 million when the contract was awarded to \$700 million.

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fares,<sup>48</sup> however, lowering fares would reduce fare-box revenues. If fares are instead raised to generate more revenue, it would probably harm efficiency.<sup>49</sup> Rather than distorting public transit fares, a more efficient, fair and direct financing instrument would be one that charged automobiles (and trucks) for their use of roads and highways. Financing instruments that could be used are reviewed in Sections 4 and 5.

### 3.3 Infrastructure funds

This discussion concentrates on grants and borrowing with a few comments on infrastructure banks.

#### Grants

For a number of years now, municipal politicians, concerned citizens, and interested journalists have been calling for more federal and provincial grant funding for roads and public transit infrastructure.<sup>50</sup> These calls raise an important question. What is the role for senior government grants in funding municipal roads and local public transit?

Grants to municipalities may be economically sound if they fund services or infrastructure that generate positive spillovers, or if they are of specific interest to donor governments. Here, the best type is a conditional grant that provides partial or full funding for a service or project with the funding rate set to match either the proportion of benefits that accrue to people outside the funding area or the proportion of benefits going to the donor government. Rephrasing this for the GTHA, one might ask “what are the benefits from the public transit and road system in the GTHA that accrue to those outside the GTHA?” As discussed in Section 7, negative spillovers such as traffic congestion and positive spillovers such as agglomeration economies extend outside municipal boundaries. A case can therefore be made for subsidies to municipalities from a larger region. However, there is little evidence that spillovers reach beyond large urban areas such as the GTHA. It is therefore unclear why people living in Moose Jaw or Halifax should pay taxes to the federal government to have it passed onto the GTHA as a grant for local transit and transportation.<sup>51</sup>

Grants create other concerns as well. First, they can distort local decision-making. Conditional transfers require municipalities to spend according to the guidelines of senior

48 Oum, Waters and Fu (2008).

49 If fares are raised, it should be done following second-best or Ramsey pricing rules to minimize the efficiency loss from reducing ridership (Gómez-Ibáñez, 1999).

50 See, for example, CUTA (2007), Toronto Board of Trade (2008), Federation of Canadian Municipalities (2012) and IMFG Forum (2012).

51 Transportation infrastructure that facilitates provincial, national and international passenger and freight movements may qualify for assistance from senior levels of government. Examples in the GTHA include Pearson International airport, and bridges crossing the Niagara River to the United States.

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governments and often require matching funds on the part of the recipient municipality. This effectively lowers the price of municipal services and encourages municipalities to spend more on these services than might otherwise be efficient. Senior governments also tend to be less well-informed about local needs than are municipal governments, and may dedicate funds to projects or services that are not the highest priority.

Second, funding from senior governments can lead to inefficient local revenue decisions. In particular, grants that cover a large proportion of capital costs may reduce incentives to price services correctly or to set up comprehensive asset management and cost recovery programs.

Third, grants reduce accountability. When two or more levels of government fund the same service, accountability problems exist when users are not sure which level of government is responsible for the project and problems that may arise. International experience tells us that governments are more likely to carry out their expenditure responsibilities in an efficient, transparent, and accountable manner if they are also responsible for raising their own revenues.<sup>52</sup>

## **Borrowing**

Municipalities engage in short-term borrowing and long-term borrowing. Short-term borrowing may be used to finance capital expenditures or to finance an unexpected deficit in the operating budget. However, municipalities in Canada cannot budget for an operating deficit. If one arises, for whatever reason, this shortfall must be recovered in the following year's budget.

For infrastructure projects that benefit future residents, fairness, efficiency and accountability are enhanced if the projects are financed by borrowing. Annual interest charges and repayment of the borrowed funds should be paid from property tax revenues (for capital assets that benefit the municipality in general but for which specific beneficiaries cannot be identified) and user fees (for capital assets that benefit specific users) imposed on future beneficiaries.<sup>53</sup> Roads and public transit are examples of infrastructure that are appropriately financed by borrowing. At the moment, this borrowing is in the form of general obligation bonds.

Road and transit infrastructure projects are also financed from reserves. This is the reverse of financing through borrowing. A "capital levy," usually a few percentage points of the local property tax, is set aside and accumulates in interest-earning accounts segregated from general revenues. These reserves may be dedicated for general capital projects or for specific projects. Reserves that are financed from general taxes, however, tend to violate the principle of intergenerational equity because current users and taxpayers pay for capital that future generations will use.

<sup>52</sup> Bird (2001).

<sup>53</sup> Bird and Wilson (2003, p.24); Kitchen and Tassonyi (2012).

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If the GTHA was permitted to implement new pricing and charging tools for roads, a case might be made for introducing revenue bonds<sup>54</sup> as a new borrowing instrument. These bonds are used in a few countries (Italy and the United States, for example) where the bonds are backed by future revenue streams that are adequate, predictable, and spread over the project's life. Their credit quality depends on the financial strength of the underlying capital asset. Where revenue bonds are secured by specific revenue sources and not by the local governments' unlimited taxing power, their credit quality is sometimes viewed as lower than that of similarly-rated general government bonds, and higher interest rates are therefore needed. To eliminate possible interest rate differentials on revenue and general government bonds, municipal governments may guarantee them. Within the benefits-based model for financing local capital infrastructure, revenue bonds may be a useful instrument. These bonds are fair, efficient and accountable as long as those who benefit from the service pay for it.

On occasion, tax-exempt bonds have also been suggested as a potential borrowing instrument for municipalities. These bonds pay interest income, but the recipient is not subject to income taxation. For the issuing municipality or agency, bonds carry interest rates that are below market rates. For example, a potential bond buyer in a 40% marginal personal income tax bracket may be indifferent between buying a taxable bond paying interest at the rate of 7.5% and a tax exempt bond paying interest at the rate of 4.5%, assuming that the bonds are equally risky or riskless. If, however, the interest rate affixed to the tax-exempt bond were above 4.5%, it would be more attractive to the investor than the taxable bond. Many municipalities in the United States issue tax-exempt bonds, but Canadian municipalities have never been permitted to use them.<sup>55</sup>

54 The City of Toronto is the only municipality in Ontario that is permitted to use revenue bonds.

55 The province experimented with tax-exempt bonds in 2003 when the Ontario government created the Ontario Municipal Economic Infrastructure Financing Authority (OMEIFA). OMEIFA made low-interest loans to municipalities for infrastructure projects on water and sewer systems, solid waste management facilities, roads and bridges, and public transit. At the beginning, the province contributed \$1.12 billion as start-up capital. Additional funds were raised from the sale of tax-exempt Ontario Opportunity Bonds. Ontario residents who purchased these bonds in the first year earned a fixed interest rate of 4.25% for five years. This interest income was not subject to Ontario income tax as long as the holder remained a resident of Ontario (the interest income was taxed under the federal income tax, however). For taxpayers in the highest provincial income tax bracket, this generated a savings of around three-quarters of one percent. In other words, a tax free bond earning 4.25% was roughly equivalent to an equally risky non tax-free bond of about 5% for the highest income earners in the province. This experiment was short-lived and is no longer used in Ontario.

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While politically popular, tax-exempt bonds have drawbacks and are not recommended here. They distort capital markets. They have also been criticized as inequitable because they provide more income tax relief to higher-income taxpayers than they do to lower-income taxpayers.

### **Infrastructure Banks**

The growing need for more reliable tools for financing infrastructure has led some authors to call for the establishment of infrastructure banks or iBanks in Canada.<sup>56</sup> Much of this interest is driven by their emergence and use in the United Kingdom and the United States.

Infrastructure banks are capitalized by a combination of funds provided by senior levels of government and the private sector. Once established, funds are available in the form of loans for a range of eligible public sector infrastructure projects. For Canada, iBanks have been touted to have a couple of advantages. They could provide loans at interest rates that are below market rates. They could provide technical assistance and expertise to municipalities and other public sector agencies that do not have the capacity to deal with projects themselves. In reality, however, these banks are unnecessary because they would do nothing more than is currently done in most provinces. In Ontario, for example, Infrastructure Ontario (IO) is a crown corporation with a mandate to manage large infrastructure projects. It operates like an infrastructure bank. It offers short-term and long-term loans for eligible public sector infrastructure projects at affordable rates. It provides access to capital market financing without fees or commissions. The length of the loan may be structured to match the life of the asset, hence there is no need to refinance over the life of the loan. Loans may be available for any depreciable asset. Finally, IO offers technical expertise and assistance for municipalities about to engage in infrastructure investment. To date, IO has committed more than \$6 billion in infrastructure funding on more than 1,000 projects ranging from the construction of roads, bridges, and facilities to the acquisition of assets, such as vehicles and equipment.<sup>57</sup>

<sup>56</sup> Lewis and Tomaszewska (2011) and Fleming (2012).

<sup>57</sup> Infrastructure Ontario (2012).

## 4.0 PARKING POLICY AND FEES

### 4.1 Background

The parking supply in Toronto is a diverse mix of residential and non-residential space located on private land, on the street (i.e., curbside), on surface lots, and in garages. The Toronto Parking Authority, a city board, controls public parking in the City of Toronto. Statistics on numbers of parking places, annual transactions and estimated revenues in 2007 are shown in Table 1.<sup>58</sup> On-street meter rates range from \$1.00 - \$3.50 per hour.<sup>59</sup> At most locations there is a three-hour maximum stay.

**Table 1: Parking places, annual transactions and estimated revenues in the City of Toronto**

Parking type	No. of places	Annual Transactions	Annual revenues (\$ million before tax)
Toronto Parking Authority off-street	20,500	14 million	60
Toronto Parking Authority on-street	18,000	25 million	36
Toronto Transit Commission off-street	14,500	?	3
Commercial	100,000	38 million	200-300
Universities	20,000		15
Hospitals	20,000	15 million	65
Other destination based	20,000		30

Source: Toronto Parking Authority (2007)

<sup>58</sup> More recent statistics are provided at the Toronto Parking Authority's website (<http://www.toronto.ca/abcc/sp-parking-authority.htm>) which states that "The TPA generates annual gross revenues of over \$113 million. There are a total of 37,700 off-street parking spaces in 213 off-street facilities generating close to \$68 million annually, plus some 18,600 on-street metered parking spaces generating in excess of \$50 million in net income annually." Green P Parking, the name affiliated with TPA parking lots, provides a slightly lower figure of 17,500 for on-street metered parking spaces (<http://parking.greenp.com/>).

<sup>59</sup> <http://parking.greenp.com/>. In July 2012, hourly rates were raised. \$2.00/hr rates rose to \$2.25/hr, \$2.50/hr rates rose to \$3.00/hr, and \$3.50/hr rates rose to \$4.00/hr (Peat, 2012).

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Although not as severe as in some other North American cities, parking policy and pricing in Toronto is flawed in two general respects. First, regulations and other institutional practices have led to excessive space devoted to parking. Minimum parking requirements oblige developers to invest in more parking infrastructure than an unregulated market would demand. Buildings come bundled with parking space that raises their cost and encourages vehicle ownership. Minimum parking requirements differ widely across the (former) municipalities of the City of Toronto.<sup>60</sup> Employer-subsidized or free parking leads to excessive space devoted to parking at workplaces, and encourages employees to drive rather than take other transport modes.<sup>61</sup> And much privately owned parking space is reserved for businesses or residents and goes unused much of the day. The result is too much land devoted to parking which discourages walking and reduces the attractiveness of downtown areas.<sup>62</sup>

A second problem is that parking is inefficiently priced. On-street parking in high-demand areas is often priced well below its scarcity value. As a consequence, drivers spend much time looking for a vacant spot. Cruising for parking accounts for roughly 30% of traffic in some cities at certain times of day.<sup>63</sup> Meanwhile, privately owned garage parking is overpriced because operators possess a degree of monopoly power due to their unique locations. Overpricing of garage parking contributes further to the stock of cars cruising for parking.<sup>64</sup> Excessive cruising for parking wastes time and delays through-traffic. Also, because people tend to drive slowly while searching, and block the road while entering and exiting parking spots, they create more congestion than drivers who are passing through.

A Nelson\Nygaard Consulting Associates (2006) study of traffic reduction measures illustrates the potential for parking fee and other parking policy reforms to yield large efficiency gains while contributing to city finances. Figure 1 from the study shows the measures adopted by 10 North American and European cities that have made significant attempts to reduce traffic congestion. Eight of the measures entail reductions in the supply of parking or increases in the price. Each of the 10 cities has employed at least five of these parking-related policies.

60 Cantos (2004).

61 Shoup (2012). According to U.S. studies, free employer parking can increase the proportion of drive-alone commuting trips by up to 50% (FHWA, 2012). For example, a 2005 survey of San Francisco Bay Area commuters found that 75% of commuters with free parking drove alone, whereas only 37% of workers without free parking did so (*SFpark*, 2011).

62 Greentown Sustainable Land Use Group (2009). This is not to say that parking space is excessive everywhere. For example, large parking structures are being built at mobility hubs in the GTHA as part of Metrolinx's transit plan, with funding from the federal and provincial governments (Christie, 2012).

63 Shoup (2006, 2007) and Au (2007). To our knowledge the extent of cruising in the GTHA has not been measured.

64 Arnott and Rowse (2009).



**Figure 1: Traffic Reduction Strategies in Ten Case Study Cities**

Place	Parking Cash-out Required	Congestion Pricing	Unbundling of Parking Costs Required	Universal Transit Pass Program	Parking Tax	Low Minimum Parking Requirements	Eliminated Minimum Parking Requirements	Set Maximum Parking Requirements
Arlington County, VA					✓	✓	✓	
Bellevue, WA (Downtown)			✓	✓	✓	✓	✓	✓
Boulder, CO (Downtown)				✓		✓	✓	
Cambridge, MA						✓	✓	✓
Lloyd District, Portland, OR				✓		✓	✓	✓
London, Great Britain		✓					✓	✓
Portland, OR (Downtown)							✓	✓
San Francisco, CA (Downtown)			✓		✓		✓	✓
Stockholm, Sweden		✓			✓	✓	✓	✓
Vancouver, B.C.				✓	✓	✓		✓

  

Place	Priced Parking	Shared Parking/Park Once	Residential Parking Permit Districts	Carpool/Ride Matching Services	Car Sharing	Bicycle Parking Requirements	Rail Transit	Bus Rapid Transit
Arlington County, VA	✓	✓	✓	✓	✓		✓	
Bellevue, WA (Downtown)	✓	✓	✓	✓	✓	✓		
Boulder, CO (Downtown)	✓	✓	✓	✓	✓	✓		
Cambridge, MA	✓	✓	✓	✓	✓	✓	✓	
Lloyd District, Portland, OR	✓	✓	✓	✓	✓	✓	✓	
London, Great Britain	✓	✓	✓	✓	✓	✓	✓	
Portland, OR (Downtown)	✓	✓	✓		✓	✓	✓	
San Francisco, CA (Downtown)	✓	✓	✓	✓	✓	✓	✓	
Stockholm, Sweden	✓	✓	✓		✓	✓	✓	✓
Vancouver, B.C.	✓	✓	✓	✓	✓	✓	✓	✓

Source: Nelson\Nygaard Consulting Associates (2006, Figure 0-2, page 3-8)

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Attention in this report is limited to three parking policies that have attracted interest for the GTHA and offer potential for substantial efficiency gains as well as revenue generation. These are commercial parking sales taxes, parking levies, and reform of parking fees.<sup>65</sup> Before examining these policies it should be noted that, by comparison with road pricing, parking policies have not been extensively studied by economists.<sup>66</sup> In part, the reason is that parking is an inherently difficult subject due to the complex mix of supply, and the imperfect nature of competition. It is also difficult to study in generalities because parking fees and parking rules vary from location to location. Parking is prohibited at certain times of day and on certain days of the week. Some curbside parking is free, but subject to a time limit. Other spots have an hourly parking rate that varies with parking duration. A further complication is that drivers searching for parking and through-traffic interact in complex ways, and only recently have models been developed to study it. Further research will be necessary before efficient parking policies can be formulated with reasonable confidence. Nevertheless, due to the pressing traffic congestion and financing challenges facing the GTHA, it is worthwhile to initiate plans now.

## 4.2 Commercial parking sales taxes

A commercial parking sales tax is a special tax imposed on parking transactions. It is usually imposed as an *ad valorem* (i.e., percentage) tax, although a flat tax that is independent of the parking fee paid is also possible. Toronto does not have a commercial parking sales tax. Vancouver introduced one on January 1, 2010, increasing the (former) provincial sales tax rate on parking from the standard 7% to 21%. The federal goods and services tax (GST) of 5% was imposed as well. When the federal and British Columbia sales taxes were harmonized on July 1, 2010, the provincial parking tax of 21% was treated as part of the base price, and the full 12% HST was imposed on top of it. The overall tax rate rose to 35.52% which is the highest in North America.<sup>67</sup> When the HST is eliminated in British Columbia, further changes may occur.

65 The other parking-related policies identified in Figure 1 are worth exploring as well for their potential efficiency gains. They are not considered here because they would not generate revenue, at least directly. Cashing-out free parking is a policy with substantial potential that is discussed in Shoup (2005, Chapter 10) and FHWA (2012). Dadson, Fleck and Tencer (1999) undertook a detailed assessment of cashing-out for the GTHA. Their analysis suggests that cashing-out scores well according to the principles for evaluating mechanisms used in this report other than for revenue generation itself.

66 A notable exception is Donald Shoup of UCLA who has studied parking policy for over thirty years and written extensively about it (e.g., Shoup, 2005).

67 Litman (2011).

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## Assessment of commercial parking sales taxes<sup>68</sup>

**Economic efficiency:** The economic impact and incidence of a commercial parking sales tax are difficult to estimate precisely. Similar to a general sales tax, a commercial parking sales tax depends on how much of the tax is passed onto customers. Most private parking in the inner city is privately operated on contract from landlords or property owners and these operators may have some discretion on how much of a parking tax they absorb by reducing the before-tax parking charge to the consumer. The effects of a tax also depend on how employment is affected and other factors that, in turn, depend on how travelers adjust to higher parking fees. Many travel decisions can be affected: trip frequency, trip chaining, travel mode, trip destination, parking location, parking duration, and so on.<sup>69</sup> With an *ad valorem* tax, the price hike tends to increase with parking duration. People parking for a longer term, such as commuters, therefore have a greater incentive to change behaviour than people parking for a shorter term, such as shoppers. The opposite is likely to be true for a flat tax because it accounts for a smaller fraction of parking outlay for longer-term parking. If the tax is imposed in a limited geographical area, motorists may choose to avoid the tax by parking elsewhere, whereas if the tax covers a wide area, it is difficult to avoid it.

To the extent that parking taxes increase the cost of driving they reduce car usage. However, according to the Toronto Parking Authority (2007) study, a tax of up to 20% on all commercial parking spaces in the City would reduce vehicular travel by at most 1% and likely have no perceptible effect on congestion and pollution. It would also have some undesirable effects.<sup>70</sup> First, since the tax would be higher in urban centres where parking is expensive, it would divert business to less dense areas where transit service is more limited, and also encourage sprawl. Second, it would encourage landowners to avoid the tax by no longer charging for parking, and it would encourage developers to bundle parking with building rent.

Compared to an *ad valorem* tax, a fixed tax has a proportionally larger effect in areas with low parking fees and short parking stays. Since short-duration trips are concentrated outside morning and evening peak periods, a fixed tax is therefore less effective than an *ad valorem* tax at reducing congestion and emissions.

68 The strengths and weaknesses of parking taxes and other potential funding instruments reviewed later in the report are listed in Table A1; see Appendix A.

69 See Toronto Board of Trade (2010) and Litman (2011). According to media reports, when the Vancouver parking tax rate was raised from 7% to 21% some drivers cancelled monthly or yearly passes although one company experienced a small increase in demand at suburban lots near SkyTrain (a light rapid transit system) stations (CTV News, 2010; Bula, 2012).

70 Toronto Parking Authority (2007), Litman (2011).

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**Accountability and transparency:** Commercial parking taxes are accountable since there is an obvious link between payment and consumption of the service. They are also transparent to consumers since the tax is identified as a separate line item in the parking bill. Transparency in terms of use of revenues depends on whether the revenues are dedicated, and if so how.<sup>71</sup>

**Ease of implementation:** At least in principle, a parking sales tax can be implemented at low cost by integrating it into the infrastructure for collecting and administering general sales taxes.

**Ease of administration:** A parking sales tax takes effort to administer because parking operators need to maintain transactions records, and audits are needed to ensure compliance. However, the same is true of sales taxes in general.

**Consistent, sustainable yield:** Parking revenues tend to be roughly proportional to distance driven which is relatively predictable. The sales tax component also rises automatically with inflation in parking rates. However, if tax revenues are concentrated in limited geographical areas and for certain types of trips, they are susceptible to downturns in the fortunes of local businesses (e.g., because of growth in shopping opportunities in suburban areas). As far as revenue generation the Toronto Parking Authority (2007) estimated that a 15% tax on all paid parking in the City of Toronto would yield annual revenue ranging from \$51 million to \$61 million depending on how much business activity decreased due to the tax.

**Fairness or equity:** Like other sales taxes, an *ad valorem* parking tax is fair in the sense that payment is proportional to the pre-tax price that is paid which correlates strongly with benefit received. Unlike a fixed tax, it is also vertically equitable insofar as higher-priced parking tends to be used by people with a higher income.<sup>72</sup> However, a tax is discriminatory in that it is paid on commercial parking, but not on free parking. It also discriminates against parking as a business activity relative to other economic activities.

71 According to the Green P Parking website (<http://parking.greenp.com/>) Toronto Parking Authority revenues are allocated as follows: operating expenses (37%), HST (11%), re-investment (10%), municipal taxes (12%) and a dividend to the City of Toronto (30%). The City therefore receives 42% of revenues. The distribution of this revenue is not identified.

72 Litman (2011).

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### 4.3 Parking levies<sup>73</sup>

A parking levy is a special property tax that is applied to non-residential parking space. Parking levies are quite flexible in design. These levies can be imposed as a fixed amount per space or based on the surface area. They can be applied to all parking, or limited to certain types such as surface parking, priced parking, unpriced parking, or parking in certain areas. Rates can be differentiated by the type of user. For example, lower rates can be applied on infrequently used spaces, or on spaces used by carpoolers, car-sharing vehicles, or disabled persons.

Parking levies are increasingly common worldwide<sup>74</sup> and they have been implemented in Canada – although with limited success. A Commercial Concentration Tax to fund public transit and roads was introduced in the Greater Toronto Area in the early 1990s. It was set at an annual rate of \$1 per square foot on large commercial properties, including paid parking facilities. Most of the costs were borne by the City of Toronto. The tax had the unexpected effect of inducing some suburban municipal and Park & Ride lots with low revenues to stop charging fees in order to avoid the tax.<sup>75</sup> Another problem was that revenues were used to fund projects elsewhere in Ontario. Due to the unpopularity of the tax, it was repealed after three years.

In 2006, Vancouver introduced a parking site tax on non-residential surface parking lots, parkades, and underground parking areas throughout the Lower Mainland. Similar to Toronto's Commercial Concentration Tax, the site tax was intended to help fund transportation infrastructure. The tax was initially set at a rate of \$30 per year on parking stalls, but it was changed to an area-based charge when difficulties with defining and enforcing a stall-based system became apparent. Considerable effort was incurred to create an inventory of parking areas which encompassed not only parking stalls, but also driveways, warehouse loading docks, passageways, and bicycle racks. The tax was seen as a form of double taxation, and hostile to business, and it was strongly opposed by small businesses which bore much higher costs per employee than large businesses.<sup>76</sup> In 2007, the B.C. government removed the tax.<sup>77</sup>

In 2010, a tax on non-residential, off-street parking facilities was set up in Montreal.<sup>78</sup> Higher rates apply for the central business district than outside, and higher rates for outdoor lots than indoor lots. Revenues from the tax are dedicated to public transit, and are expected to be about \$20 million annually.

<sup>73</sup> This section draws on Manahan (1990), Toronto Parking Authority (2007), Transport Canada (2011), Litman (2011) and FHWA (2012).

<sup>74</sup> Doolittle (2012).

<sup>75</sup> IBI Group et al. (2000).

<sup>76</sup> Stewart (2006).

<sup>77</sup> Vancouver Sun (2007).

<sup>78</sup> Alfaro (2010) and Ville de Montréal (2012).

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## Assessment of parking levies

**Economic efficiency:** Unlike a commercial parking sales tax, a parking levy is not paid directly by customers and it does not depend on the amount of business transacted (unless specifically designed to do so) or the amount of parking activity that takes place. Some businesses may simply absorb the tax while others may increase prices to preserve profit margins or remain viable. Both the direction and magnitude of the effects depend on what is subject to the levy.<sup>79</sup> A universal levy is likely to reduce total parking supply. A levy confined to priced parking will tend to reduce commercial parking supply, and increase the amount of unpaid parking and bundled parking. As explained earlier, these adjustments tend to reduce economic efficiency. Conversely, a levy imposed on unpriced parking only will encourage paid parking and boost efficiency. Finally, levies that apply to small areas may shift parking supply and business to other areas.<sup>80</sup> To the extent that this action increases driving and walking distances, it is undesirable.

**Accountability and transparency:** Unlike a commercial parking sales tax, a parking levy is not visible to customers and hence does not score as well with regard to transparency. It is less accountable because only a tenuous connection exists between payment and benefit received from the taxed area.

**Ease of implementation:** A parking levy is more cumbersome to implement than a commercial parking sales tax because it requires a parking space inventory. Doing so is easier for a tax that is based on parking stalls than it is for an area-based tax. In the case of Vancouver's parking site tax, creation of the parking site inventory, implementation of the tax and administration of the appeal process is estimated to have cost \$3 million.<sup>81</sup>

**Ease of administration:** A parking levy may be cheaper to administer than a commercial parking tax because there is no need to monitor parking activity. Vancouver's parking site tax was included on municipal property tax notices so that property owners did not have to pay a separate tax bill.

**Consistent, sustainable yield:** Four studies have considered parking levies for Toronto. The Toronto Parking Authority (2007) study estimated that if an area tax were applied at the same rate as Vancouver's parking site tax, annual revenues would be about \$22.6 million. According to the study, another study by Hemson Consulting considered a parking-space tax limited to central areas of Toronto. If imposed at a rate of \$100 per space, it would yield estimated revenue of only \$7.5 million. The Toronto Board of Trade (2010) considered a \$1 daily surcharge on non-residential parking spaces and identified the potential revenue to be \$1 billion per year. Finally, City of Toronto

79 Litman (2011).

80 Gillen (1977, 1978).

81 Transport Canada (2011).

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(2012) estimated that a parking levy of \$365 per space (i.e., \$1 per day) would generate \$1.08 billion per year.<sup>82</sup>

***Fairness or equity:*** Like commercial parking sales taxes, parking levies are more horizontally equitable if they are imposed on all parking. But they are less fair than taxes because payment is not closely (if at all) related either to usage of the parking space or the profitability of businesses that pay the levy. Vancouver’s parking site tax was considered discriminatory and regressive because of the high costs that small businesses bore per employee.

#### **4.4 Reforming parking fees**

As noted in Section 4.1, pricing of parking in the GTHA is inefficient in the sense that it does not adhere closely to marginal-cost pricing principles. Some parking lots and garages issue monthly parking passes. These simplify transactions and provide guaranteed parking space, but they encourage people to drive because the incremental parking cost is zero. Passes could be replaced by bulk purchases of a given number of parking hours that do not expire at a given date but rather diminish in value only when they are used.<sup>83</sup>

More severe deficiencies exist for on-street parking. Conventional, mechanical parking meters are simple to operate, but they are time-consuming to service and maintain, and the costs of collection and enforcement amount to a substantial fraction of the revenues. Conventional meters also lack the flexibility to vary fees efficiently by time of day, duration of stay, and demand conditions. Time limits (e.g., of 1-2 hours) are often used to encourage parking turnover, but they encourage parking search and are less efficient than variable rates.<sup>84</sup> Time limits are also costly to enforce, and parkers incur inconvenience and stress to avoid parking tickets.<sup>85</sup>

Electronic meters are now in widespread use. They allow hourly rates to vary by time of day and duration. To maintain high utilization rates of parking space while minimizing time spent on search, parking fees can be set to maintain a target average occupancy rate of parking spots within a defined area.<sup>86</sup> To achieve this, parking fees can be set either dynamically (i.e., in real time) or adjusted periodically. Occupancy-based pricing has been successfully implemented in Redwood City, California, and Pasadena. The policy has dramatically reduced cruising for parking without causing losses to businesses.<sup>87</sup>

82 The study describes the estimate as “based on Toronto Parking Authority parking space inventory and extrapolated for GTHA.” (p.10).

83 Grush (2012b).

84 Calthrop and Proost (2000).

85 Greentown Sustainable Land Use Group (2009).

86 This idea dates back to Vickrey (1959).

87 Nelson\Nygaard Consulting Associates (2006) and Greentown Sustainable Land Use Group (2009).



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Several cities are now testing larger-scale versions of occupancy-based pricing.<sup>88</sup> Seattle is employing a low-technology approach that requires manual meter inspection. By contrast, the San Francisco experiment, *SFpark*, uses “smart” meters that permit several means of payment, charge variable rates, record parking usage and duration with sensors, and transmit the data remotely to a central collection system.<sup>89</sup> Occupancy-based pricing is also used for off-street parking using a similar adjustment procedure as for curbside parking.<sup>90</sup> Fee rates are set to encourage motorists to use parking garages in order to (further) reduce the search for curbside parking.

In addition to occupancy-based pricing, the *SFpark* program helps drivers to find parking by providing a combination of historical and current information using variable message signs, text messages, and other media. The goal is to reduce door-to-door travel times and foster public acceptance of the technology.

### **Assessment of parking fees**

***Economic efficiency:*** A coherent system of parking fees based on marginal costs would enhance efficiency and it would probably also raise parking revenues. Empirical evidence is sparse because few cities have implemented or experimented with novel parking schemes. De Borger and Proost (2001) summarize estimates of the relative efficiency of parking charges, kilometre charges, fuel taxes, and public transport pricing for various cities and countries. They report that in some cases parking charges (combined with toll cordons) can achieve efficiencies of more than 70% of the theoretical maximum. According to some theoretical studies, raising curbside parking rates to eliminate cruising for parking yields substantial efficiency gains without making drivers worse off<sup>91</sup>, and the benefits from reduced traffic congestion can exceed the revenue generated several-fold.<sup>92</sup>

***Accountability and transparency:*** Parking fees are accountable because there is a clear link between payment and consumption. Like other market transactions, they are transparent because there is an explicit payment. Fees are also transparent in terms of revenue use if either the operator is private, or it is public and the revenues are dedicated to running the service or local transportation.<sup>93</sup>

88 FHWA (2012).

89 The scheme is described in *SFpark* (2011) and at <http://SFpark.org/about-the-project/>.

For the experiment, parking fees are reviewed monthly rather than being adjusted dynamically.

90 *SFpark* (2012).

91 Arnott and Inci (2006) and Shoup (2006).

92 Arnott and Rowse (2009).

93 Nelson\Nygaard Consulting Associates (2006) recommend that parking meter revenue be allocated to the neighborhoods that generate it. Commercial Parking Benefit Districts and Residential Parking Benefit Districts could be created for this purpose.

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**Consistent, sustainable revenue yields:** Raising curbside parking fees to eliminate cruising will almost surely boost revenues since increases in the monetary price will be largely (and possibly more than fully) offset by reductions in drivers' search time, walking time, and fears of arriving late at the destination. Put another way, people will be willing to pay more for parking if the time and other costs of parking are reduced.<sup>94</sup> Reductions in traffic congestion will also facilitate traffic flow to and from parking areas. The revenue implications of reforming off-street parking prices are not as clear although the *SFpark* project goal of attracting motorists to garages suggests that garage revenues will increase. Moreover, to the extent that travel becomes more pleasant, it will attract businesses and residents to central areas, which will enhance revenues from sales taxes and other revenue sources.

**Ease of implementation:** Variable parking fees are already widely used at parking lots and garages, and using advanced meters they can be extended to on-street parking. Experience in San Francisco and other cities where advanced meters and occupancy-based pricing have been introduced should facilitate adoption.<sup>95</sup>

**Ease of administration:** Compared to conventional parking meters, smart meters require less labour for collection and maintenance and they dramatically reduce the need for enforcement and parking fine administration. Wireless networked meters can also provide real-time information on payment transactions and accumulated revenue at each location.<sup>96</sup>

**Fairness or equity:** Parking fees are similar to *ad valorem* parking taxes as far as horizontal and vertical equity. As a user fee, they adhere to the beneficiary principle. Variable rates discriminate appropriately on the basis of length of stay. To assess their distributional effects accurately it would be necessary to examine the socioeconomic characteristics and mix of trip purposes of parking users at a geographically-disaggregated level.

94 Revenues from parking fines are likely to drop significantly if parking time limits are replaced by variable parking rates and electronic payment methods that do not require prepayment. For example, *SFpark* (2011, p.12) states that “*SFpark* will increase meter revenue by making it easy to pay for parking, which is expected to compensate for reduced parking citation revenue.”

95 According to *SFpark* (2011, p.14), the San Francisco system “is relevant for other cities because it is easily replicable.”

96 See Grush (2009) and Stirling (2009).

## 5.0 ROAD PRICING<sup>97</sup>

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### 5.1 Introduction

Road pricing has been gaining support as a travel demand management tool to internalize congestion, pollution, and other external costs of driving. Transportation economists have long argued that some form of congestion pricing is the most effective policy instrument for tackling traffic congestion. The general principles for congestion pricing are well-established.<sup>97</sup> More so than parking fees, congestion tolls can influence all dimensions of travel choices: trip frequency, destination, travel mode, time of day or week, route, and so on. Tolls can be set at optimal levels conditional on travel demand and supply conditions whether or not road capacity and other elements of infrastructure are optimal.

During the nineteenth century many toll bridges and toll roads in Canada were owned and operated by municipalities and private companies.<sup>98</sup> The main goal was to pay for the infrastructure. Most of the tolls were eventually removed by provincial governments. Prior to Highway 407, the most recent tolled facility in the GTHA was the Burlington Skyway Bridge. Tolls were removed in 1973. Only 21 facilities in all of Canada are tolled now, and all of them are bridges or highways.<sup>99</sup> Toll revenues are minimal. In 2010, personal expenditures on tolls amounted to \$504 million: just 0.4% of total personal expenditures on roads.<sup>100</sup> More than half the total was generated on Highway 407. Moreover, the tolls bear little resemblance to efficient charges for internalizing congestion or other externalities. Except on Highway 407 and the Autoroute 25 expressway linking Laval and Île de Montréal, tolls do not vary by time of day. Several facilities offer discounts for frequent users, which are hard to justify on efficiency grounds.

Congestion pricing has not been implemented anywhere in Canada and plans have not been developed for any city. Detailed plans are necessary because the effects of tolls and the amount of revenue generated are sensitive to what parts of the road network are tolled, demographic characteristics of the area, and various other factors.

97 See Small and Verhoef (2007, Chap. 4).

98 Bryan (1972).

99 The Deh Cho Bridge crossing the Mackenzie River in the Northwest Territories opened to traffic on November 30, 2012. A toll is imposed on commercial vehicles but not passenger vehicles (<http://www.dehchobridge.info/project.html>). Tolling of the new Port Mann Bridge in Vancouver began on December 8, 2012 (<http://www.cbc.ca/news/canada/british-columbia/story/2012/11/13/bc-port-mann-bridge.html>). Plans are underway to extend Highway 407 east to Highway 35/115. Since the extension will be owned and operated by the province, rather than 407 ETR, it will effectively become a 22nd tolled facility.

100 Transport Canada (2010a, Table EC76). By comparison, in 2010 roughly \$10 billion in toll revenue was collected in the United States (Fleming et al., 2012).

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There are many decisions to make in designing a road pricing scheme<sup>101</sup>:

- what parts of the road network to toll;
- how to price usage (e.g., by road link, by distance, by time);
- what technologies to use for toll collection and enforcement;
- the toll structure (e.g., time variation, caps on daily toll paid);
- vehicle categories (e.g., light, heavy single unit, heavy multiple unit);
- discounts or exemptions for certain types of vehicles or users (e.g., taxis, electric vehicles, disabled persons)
- access restrictions (e.g., prohibitions on motorcycles or large trucks)

Discussion in this section is organized around the first of these characteristics: what parts of the road network to toll.

## 5.2 Forms of road pricing

Road pricing has been implemented in various ways around the world. The main options are described here in order of increasing scale.

### Individual lanes

Tolls can be imposed on individual traffic lanes. In the United States, tolling has been implemented on high occupancy toll (HOT) lanes which can be used without charge (or at a discounted rate) by vehicles that meet a minimum occupancy requirement – typically two people (HOV2) or three people (HOV3). HOT lanes run parallel to toll-free lanes on the same road. The toll-free lanes are typically slower during peak times. Drivers can choose on each trip whether to take the HOT lanes and pay for a quicker and more reliable passage. Tolls are varied by time of day in order to maintain high speeds on the HOT lanes. On some facilities tolls are varied hourly according to a schedule that is revised every few months. On other facilities the tolls are adjusted dynamically every few minutes on the basis of currently-measured traffic flows.<sup>102</sup>

101 NCHRP (2012).

102 On some facilities electric and hybrid vehicles have been allowed to use HOT lanes toll-free without meeting the normal occupancy requirement. But as these vehicles have proliferated, traffic volumes on HOT lanes have grown. To maintain high speeds on the HOT lanes it has been necessary to raise tolls which reduces the number of toll-paying drivers willing to use them. To address this problem, hybrid vehicle exemptions are being reconsidered. An alternative to raising tolls is to tighten occupancy requirements from HOV2 to HOV3, or to require HOV2 vehicles to register as official carpool vehicles.

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## Individual roads

By far the most common form of road pricing is on individual roads. Most roads still feature flat tolls that do not vary by time of day. But time-varying tolls are becoming more common, and they are used on Highway 407 and the Autoroute 25 expressway in Montreal. In the United States, the term “electronic toll lanes” is used when all lanes of a road are priced by time of day. Truck-only toll lanes are another potential form of pricing that has been studied in the United States, but not yet implemented anywhere.<sup>103</sup>

Tolling all lanes at different rates is more efficient than tolling only some lanes because it allows better control over the total number of vehicles using the road as well as the distribution of traffic across lanes. A study by Small, Winston, and Yan (2006) demonstrates that differential pricing can achieve a favourable trade-off between efficiency and equity compared to HOT lanes.<sup>104</sup>

## Area-based schemes

Road pricing can be implemented within areas using cordons or zones. Cordon schemes comprise one or more toll cordons around a city centre or other congested area. Vehicles are charged for crossing the cordon(s) in one or both directions. Single cordons have been used in Singapore since 1975, in several Norwegian cities since the 1980s, and in Stockholm since 2006. With a zonal scheme, a toll is levied for moving within the zone as well as for crossing the boundary. Just two zonal schemes are currently operating: the London Congestion Charge (since 2003), and Area C in Milan (since 2012).<sup>105</sup> Both schemes are aimed at reducing congestion. In Milan, Area C was preceded by the EcoPass system which operated from 2008 to 2011, and was designed mainly to reduce pollution rather than congestion.

Area-based schemes are sometimes referred to as “congestion pricing.” This terminology may have arisen because, as its name indicates, the London Congestion Charge is targeted at congestion. The term is misleading because the Norwegian toll cordons were established mainly for revenue generation rather than congestion relief, and the former Milan EcoPass zone was implemented to combat pollution. Moreover, cordons and zonal schemes are not ideal for congestion relief because of their crude spatial boundaries.

103 NCHRP (2012).

104 Recent proposals for tolling new HOT lanes and all lanes of new roads in the Chicago area and Florida are described in Hilkevitch (2012) and TOLLROADSnews (2012) respectively.

105 On 1 January, 2013, Gothenburg introduced a cordon similar in design to the Stockholm scheme (Scandinavia Today, 2013).

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### **Distance-based road pricing**

Distance-based charges have been implemented nationally for heavy goods vehicles in Switzerland, Austria, Germany, the Czech Republic, and the Slovak Republic. Other European countries are developing or considering them. These schemes are designed mainly to generate revenues. Mileage-based user fees (MBUFs) are being studied in the United States as a long-term supplement or replacement for fuel taxes as a revenue source. Technology studies of MBUFs were conducted in Oregon, the Puget Sound region, and several other states.

Any comprehensive form of road-pricing for trucks or cars would probably be most cost-effective if it used global navigation satellite systems (GNSS) technology – called GPS technology in North America. GNSS is used for trucks in Germany and the Slovak Republic. The technology is scalable, and it could be used to charge for congestion in urban areas as well as to raise revenue. Nevertheless, plans for MBUFs in the United States have been stalled by costs and many complexities related to equipment standards, accuracy, rate structures, enforcement, privacy, treatment of vehicles that lack on-board equipment, distribution of revenues among states, and other challenges.<sup>106</sup>

Many analysts argue that GNSS systems cannot be cost-effective unless they are enabled to perform other functions such as Pay As You Drive (PAYD) insurance, providing information advisories and navigation. Such systems might also be used for parking applications including navigation, parking availability information and on-street and off-street payments (cf. Section 4).

### **National road pricing**

National distance-based schemes for passenger vehicles were planned for the United Kingdom and the Netherlands, but they were derailed for political and public acceptability reasons.<sup>107</sup> In both countries the plan was to make the system revenue neutral by eliminating vehicle excise duties and reducing fuel taxes. Revenue neutrality would not be easy (or likely desirable) for Canada because registration fees, licensing fees, and fuel taxes are much lower than in Europe.

## **5.3 Road pricing technologies**

Tolling has been implemented using a range of technologies: conventional toll booths, cameras combined with automatic number plate recognition (ANPR) software, transponders combined with dedicated short range communications (DSRC), and satellite technologies.<sup>108</sup> Transponders and cameras are both used on Highway 407, the

<sup>106</sup> Grush (2012a).

<sup>107</sup> The idea of a national scheme for the United Kingdom has recently gained new life (Jeory, 2012).

<sup>108</sup> de Palma and Lindsey (2011) review road-pricing methods and technologies.

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Autoroute 25 Bridge in Montreal, and the Golden Ears Bridge and the new Port Mann Bridge in Vancouver. On the 12 bridges connecting Ontario and the United States, a mix of manual payment methods (cash, tokens, debit cards) are used. On toll roads with electronic systems, payments are made either with accounts or using stored-value cards. Account systems require back office operations, but they accommodate a variety of payment methods and are better adapted for toll differentiation.<sup>109</sup>

A number of transponder brands using incompatible technologies are used in North America. No continental standard technology or financial system for exchanging and settling transactions has been established. This creates a challenge for interoperability, which is a concern for the GTHA if a seamless charging system is to be created that covers Highway 407 as well as vehicles traveling to and from the United States. Another challenge for HOT lane tolling is that vehicle occupancy cannot yet be determined using automatic vehicle identification systems, and privacy concerns may impede implementation of automatic systems if they are eventually developed.<sup>110</sup>

Depending on the technology used, tolling involves costs for roadside infrastructure and operation, in-vehicle equipment and calculation of charges.<sup>111</sup> Roadside infrastructure is expensive to install, takes up space, requires maintenance and is at risk of vandalism. Given the high costs, camera or transponder systems are cost-effective only for high-volume roads. According to the National Surface Transportation Infrastructure Financing Commission (2009), collection costs for roads in the United States are about 16% of toll revenues. However, as explained in Fleming et al. (2012), costs are difficult to estimate for several reasons. Toll authorities use different financial reporting conventions. Some studies have treated as annual costs the significant, but one-time, costs of converting from manual to electronic collection operations. And costs are continuing to fall as interoperability between toll operators improves. According to Fleming et al. (2012), some operators using all electronic tolling have achieved costs as low as \$0.25 per transaction (i.e., 5% of the revenue from a \$5.00 toll).

The costs of area-based road pricing schemes are even more difficult to pin down than for toll highways because the schemes are few in number and differ greatly. Estimated collection costs as a fraction of toll revenues are 21% in Singapore, 22% for the Stockholm Trial, and 50–60% for London. Operating costs are proportionally lower for the heavy goods vehicle schemes in Europe.

One reason for the high costs of London and the Stockholm trial is that a relatively narrow political window of opportunity was available in which to implement them. Hamilton (2011) identifies several other reasons for the expense of the Stockholm trial: the costs included purchase of new buses and park-and-ride facilities; a call centre was

109 IBTTA (2012).

110 Poole (2011a) and NCHRP (2012).

111 See de Palma and Lindsey (2011) for details.



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established with more capacity than proved necessary<sup>112</sup>; and dual camera and transponder systems were implemented. The camera technology available at the time achieved only 60-70% recognition accuracy, but this improved greatly soon after and the transponder system was eventually removed at most tolling stations. Hamilton (2011) argues that detection reliability rates of 100% are not actually necessary. A system with, say, 95% reliability will deliver 95% of the revenues that are due, and would influence drivers' behaviour in nearly the same way as a system with 100% reliability.

#### **5.4 Successes and failures with road pricing**

Attempts to implement modern-day road pricing have succeeded in some cities and countries, but there have also been many failures. Worldwide experience with road pricing has been reviewed in numerous studies<sup>113</sup>, and coverage here is accordingly selective and brief.

Major successes with road pricing in the United States are the (numerous) conventional toll roads that employ electronic toll collection, and the dozen-or-so HOT lane facilities. In Canada, Highway 407, the Golden Ears Bridge in Vancouver, and Autoroute 25 in Montreal can be considered technological and operational successes although all of them are designed to generate revenue rather than to relieve congestion. The major area-based successes are Singapore's Electronic Road Pricing system, the London Congestion Charge, the Stockholm Congestion Tax and the Milan EcoPass (reincarnated in 2012 as Area C). The London, Stockholm, and Milan schemes are assessed in Leape (2006), Eliasson (2009) and Rotaris et al. (2010) respectively. All three studies conclude that the benefits of the schemes easily exceed their costs. Anas and Lindsey (2011) review these cost-benefit studies as well as other evidence. The three schemes performed broadly in line with expectations. Some travelers switched to public transport, others changed routes, and still others rescheduled trips or canceled them.<sup>114</sup> Although some of the shifts differed in magnitude from what was forecast, no major changes were made to any of the schemes. Another common finding is that the estimated benefits from quicker and more reliable trips dominated environmental benefits. Downtown businesses in London and Stockholm appear not to have suffered any revenue losses, and shoppers who continued to drive in to the charged areas found it easier to park.<sup>115</sup>

112 The overcapacity may have been a sensible insurance strategy.

113 See, for example, Gómez-Ibáñez and Small (1998), Small and Verhoef (2007, §4.3), Santos and Verhoef (2011) and Anas and Lindsey (2011).

114 Using an advanced transportation model that accounts for network effects, departure-time decisions and heterogeneity of individual preferences, Borjesson et al. (2012) find that most drivers actually benefit from the Stockholm charge even before accounting for how the revenues are spent.

115 We are not aware of business studies of Milan.

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These successes notwithstanding, many attempts to introduce road pricing have failed. Notable examples are double cordon tolling schemes planned for Edinburgh (2005) and Manchester (2008), and a composite cordon and zonal scheme for Manhattan (2008). The Edinburgh and Manchester proposals were rejected by public referenda, and the Manhattan proposal was stopped by the New York state legislature. These failures can be attributed partly to design flaws, and partly to inadequate outreach to overcome public and political opposition.

## 5.5 Road pricing and investment

This report is mainly concerned with how roads and public transit should be funded rather than with how much money is needed. Nevertheless, the choice of funding mechanism can affect the amount of revenue required. As noted in the Introduction, this feedback effect is usually ignored when infrastructure deficits are estimated. Feedbacks have not been extensively studied for any funding mechanisms, but a few studies have explored the link between road pricing and road investment.<sup>116</sup> It is often assumed that less road capacity is needed if road pricing is implemented because traffic volumes decrease. However, without road pricing usage is underpriced and the private benefits of some trips fall short of their social costs. Road capacity is therefore partially wasted. Empirical studies have found that this effect can be quite strong.<sup>117</sup> By curbing excess demand, road pricing preserves the benefit from roads so that it can enhance, rather than diminish, the value of capacity investments. Whether road pricing and investment are substitutes or complements for each other is therefore an empirical question, and the answer depends on the quality of public transit service and other factors that need to be examined at a local level.

A few studies have investigated how road pricing affects optimal public transportation fares and capacity.<sup>118</sup> If road pricing were implemented on a large scale, automobile usage would no longer be underpriced and one of the three traditional reasons for subsidizing transit would fall away (cf. Section 3.2). Optimal fares would increase, which would boost fare-box revenues and ease financial pressures. It is less clear whether optimal transit service would increase or decrease. The answer depends, amongst other factors, on whether transit operates on a separate right-of-way (as it does for rail and subway systems) or shares the road with cars. In the latter case, transit vehicles (usually buses) can circulate more freely as congestion eases. Road pricing thus sets off a virtuous circle as car traffic declines, transit ridership and service expand, car traffic drops further as people switch to transit, and so on.

116 Discussion here draws on Lindsey (2012).

117 See, in particular, Duranton and Turner (2011).

118 See Lindsey (2012) for references.

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In summary, road pricing is likely (but not certain) to reduce the need for new road capacity and increase the need for public transit. Major infrastructure plans such as The Big Move should be designed with these considerations in mind.

## 5.6 Assessment of road pricing

Each form of road pricing has its strengths and weaknesses. There is insufficient space here to assess each alternative against the six evaluation criteria, and the evaluation is therefore selective.<sup>119</sup>

**Economic efficiency:** In theory, tolling individual links (i.e., lanes or roads) is optimal for either congestion relief or revenue generation if all links can be tolled and the tolls can be freely differentiated by link, time of day, and vehicle type.<sup>120</sup> But these conditions are unlikely to become reality in the near-to-medium-term future, if ever. Road-price schemes must therefore be designed and evaluated while trying to account for unpriced links on parts of the road network and any other distortions.

The main drawback of tolling only some roads is that traffic may divert to untolled alternatives. Under the *City of Toronto Act*, the administration can toll roads under city jurisdiction, including the Don Valley Parkway and the Gardiner Expressway. Tolling just these links, however, would cause traffic diversion onto parallel streets and arteries.<sup>121</sup> Tolls can be set at reduced levels to account for these effects, but the benefits and revenues from tolling are generally much lower than when substitute routes are tolled as well.<sup>122</sup> Diversion is less of a problem for area-based schemes that extend over a wide area. Diversion has not been a serious problem for the London, Stockholm, or Milan schemes and, as noted above, studies have concluded that their benefits easily outweigh their costs.

119 More detailed assessments are found in de Palma and Lindsey (2011), Litman (2012a) and NCHRP (2012).

120 Yang and Huang (2005).

121 Traffic diversion is evident on some tolled facilities. For example, an increase in tolls on the Ohio Turnpike caused trucks to divert onto alternative roads that were less safe (Swan and Belzer, 2010). Traffic diversion has also become a concern for the new Port Mann Bridge in Vancouver where tolling began on December 8, 2012. Traffic volumes have increased appreciably on the Pattullo Bridge which crosses the Fraser River a few kilometres downstream (Sinoski and McKnight, 2012).

122 Verhoef, Nijkamp and Rietveld (1996). Diversion is particularly easy on HOT lanes because toll-free lanes run in parallel on the same road. Yet Small, Winston and Yan (2006) find that optimal tolling of a representative HOT lane facility yields an average social benefit of about US \$2.25 per trip. These significant benefits arise because HOT lanes offer drivers a choice. Drivers with high values of time and drivers who cannot afford to be late choose to pay the toll for quicker and more reliable trips while other drivers opt for the toll-free lanes.

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**Accountability and transparency:** Like parking fees, road tolls are accountable because of the link between payment and consumption of a service. Tolls are also transparent in terms of their visibility to drivers as well as the disposition of revenues if the revenues are dedicated to local transportation in a clear way.

**Consistent, sustainable revenue yields:** Toll revenues are similar in consistency and sustainability to revenues from parking fees. Both vary roughly in proportion to the amount of vehicle travel. And both are less predictable when implemented on a small part of the road network (e.g., parking fees on a few downtown blocks, or tolls on a single road) when compared with a large area. Toll revenues will obviously be higher the more widely tolling is applied. In 2011, 407 International earned gross revenues of \$675 million (net income \$128.3 million) from Highway 407, with an average revenue per trip of \$5.89.<sup>123</sup> Dachis (2011) has estimated the revenues from two potential toll-lane schemes in the GTHA. One scheme entails construction of HOT lanes on the western part of the Gardiner Expressway as well as express toll lanes on the eastern part of the Gardiner Expressway and the inside express lanes on Highway 401. Dachis estimates annual gross toll revenues of \$294 million. The second scheme involves converting existing HOV lanes on 400-series highways in the GTHA<sup>124</sup> to HOT, and building out the remainder of Ontario's 450-kilometre *HOV Lane Network Plan* as HOT rather than HOV lanes.<sup>125</sup> This option yields gross toll revenues of \$632 million.

Two other tolling studies of the GTHA were conducted in 2007. Hemson Consulting (2007) considered tolling the Don Valley Parkway and Gardiner Expressway. It assumed weekday tolls of \$0.10/km during peak periods, and \$0.05/km during non-peak periods. Estimated annual revenues were \$120 million if there was no traffic diversion, and \$74 million with a diversion rate of 40%. The other study by Toronto City Summit Alliance (2007) considered a toll of \$0.07/km on all 400-series highways in the GTHA. This plan yielded much higher estimated revenues of \$700 million per year. The recent City of Toronto report estimated that a charge of \$0.10/km on all highways would generate \$1.5 billion in annual revenues.<sup>126</sup>

123 <http://www.dcnonl.com/article/id48825/--407-international-reports-earnings-increase-from-ontario-toll-highway>.

124 HOV lanes with an occupancy requirement of at least two people (HOV2+) are operating on Highways 403, 404, 417 and the QEW (<http://www.mto.gov.on.ca/english/traveller/hov/>).

125 Ministry of Transportation – Ontario (2007).

126 City of Toronto (2012).

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The revenue estimates from these four studies suggest that tolling can yield substantial revenues. Comprehensive tolling of all roads using distance-based pricing could produce much larger revenues yet. The costs of tolling are hard to estimate although the U.S. studies mentioned above indicate that operating costs are in the neighborhood of 15% of toll revenues and possibly as low as 5% for new, all-electronic tolling. Costs are likely to continue falling over time with further technological advances and operating experience. Of course, revenues could also fall (holding toll levels constant) if tolling induces changes in travel behaviour and land usage patterns that reduce driving.

***Fairness or equity:*** Similar to efficiency and revenue yield, the equity effects of tolling are sensitive to how it is implemented. Horizontal equity generally improves with geographical scale. At present, residents of Halton and Durham may have no reasonable alternative to using Highway 407 for traveling east-west across the GTHA. Tolling all 400-series highways would spread the benefits and costs of tolling more evenly through the region. But tolling is likely to be phased in rather than introduced all at once, perhaps starting with a HOT lane scheme or a single road and then expanding to express lanes and multiple roads or road networks. Equity will also be affected by how much investment in roads and public transit occurs. Any such investments will take place gradually over an extended period. Lucky regions will benefit from improvements within a few years while others will have to wait much longer.<sup>127</sup> Some degree of horizontal inequity is inevitable. If the investments are cost-effective, however, it is surely better to make them one by one than to hold everything up indefinitely out of overblown concern for horizontal equity.

The vertical equity effects of tolling depend on how revenues are used, and on whether low-income groups are given preferential treatment. Discounts or exemptions on tolls are not recommended because they weaken incentives to alter travel behaviour, reduce revenues, and complicate accounting and enforcement.<sup>128</sup> Both horizontal and vertical equity could also depend on how much tolls vary by time of day, and on whether tolls are designed to generate revenue, to manage demand or pursue some combination of both.

<sup>127</sup> Lorinc (2012) and Garrett (2012).

<sup>128</sup> Lindsey (2007).

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Tolling is widely viewed as harmful to the poor, but it may be less regressive than other funding mechanisms. Schweitzer and Taylor (2008) compare the cost burden of paying tolls on the HOT lanes on State Route 91 in Orange County, California, with the equivalent cost burden under Orange County's local-option transportation sales tax. They find that the sales tax redistributes money from poorer to richer households. A shift from the sales tax to the tolls leaves the lowest and highest quintiles of the income distribution better off, and the three middle quintiles worse off. The welfare effect of the shift therefore does not vary uniformly with income, and is ambiguous in terms of vertical equity.

***Ease of implementation:*** Although Highway 407 and recent bridge projects in Canada provide some guidance, road pricing will be more costly and difficult to implement than existing and well-established revenue sources such as the sales tax or parking fees. Public acceptance is also a barrier as discussed in Section 7.

***Ease of administration:*** Charging a toll involves a number of steps: vehicle detection and communication, billing, accounting, enforcement, infrastructure maintenance, and so on. The costs depend on various factors including the technology used, the number of vehicle categories that are distinguished, time variation in tolls, and so on. Rough estimates of the costs as a fraction of revenues were mentioned earlier. In addition, the costs of compliance by motorists should be factored in although they are harder to quantify.

## 6.0 OTHER REVENUE INSTRUMENTS

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A number of taxes could be used to finance roads and transit in the GTHA. This section covers fuel taxes, motor vehicle registration fees, and a regional sales tax. It also reviews the merits of public private partnerships as a mechanism for financing and delivering large infrastructure projects. The report does not consider privatization of roads or public transit services.<sup>129</sup> Whatever the merits of privatization, private roads are unlikely to be introduced in Canada in the near future.

### 6.1 Fuel taxes

Federal and provincial fuel taxes are imposed on retail sales of gasoline and diesel fuel in the GTHA, and the HST is added to the consumer price inclusive of taxes. Traditionally, revenues collected from the federal and Ontario fuel taxes have not been dedicated to transportation but have gone into general funds. This practice has changed somewhat in recent years. Approximately 40% of federal tax revenues are allocated to municipal infrastructure through the Gas Tax Fund, and two cents per litre of the Ontario tax goes to public transit.

The impact of increased fuel taxes on fuel tax revenue and economic efficiency depends, crucially, on how it affects driving behaviour. Because the retail market is competitive, and the region accounts for a very small portion of the world oil market, an increase in fuel taxes tends to be fully passed on to consumers in higher prices at the pump. The effects of fuel prices on fuel consumption, vehicle ownership, total vehicle kilometres traveled, and emissions of local pollutants and greenhouse gases have been studied extensively since the 1970s. Graham and Glaister (2002) present a comprehensive international survey for automobile gasoline consumption. They find an average short-run price elasticity of about  $-0.3$ , and an average long-run elasticity between  $-0.6$  and  $-0.8$ .<sup>130</sup> Roughly three-quarters of the short-run reduction in gasoline consumption occurs from reductions in distance driven. The remaining quarter is caused by reductions in the vehicle fleet, and shifts in usage toward more fuel-efficient vehicles. In the long run, improvements in fuel economy add substantially to the short-run responses.

Since fuel taxes comprise only a fraction of the retail gasoline price, the elasticity of fuel consumption with respect to the gasoline tax is smaller than the elasticity with respect to the retail price. Given current tax rates and the average price of gasoline in Toronto, the Graham and Glaister (2002) fuel price-elasticity estimates translate to fuel tax-elasticities

<sup>129</sup> Boardman and Vining (2012) review experience with privatization in Canada. Small (2010) looks at the economics of private highway provision.

<sup>130</sup> The elasticity is defined to be the percentage change in consumption divided by the percentage increase in price. These estimates imply that a 10% increase in the price of gasoline induces a 3% reduction in fuel consumption in the short run, and a 6-8% reduction in the long run.



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of about – 0.1 in the short run, and -0.19 to -0.25 in the long run.<sup>131</sup> Though fairly small, these elasticities are still appreciable and imply that the base for the gasoline tax erodes as fuel taxes rise.<sup>132</sup>

Three recent North American studies present evidence that fuel prices may have larger impacts on fuel consumption and travel behaviour than older studies suggest. Using U.S. household data and a sophisticated model of household vehicle purchase and usage decisions, Spiller and Stephens (2012) estimated a relatively large average household short-run price elasticity of -0.67. Elasticities are larger for households that face higher gasoline prices, own more vehicles, and drive greater distances. This pattern can be explained by the fact that such households devote a larger-than-average share of income to driving and hence are affected more acutely by higher fuel prices. A related study by Spiller et al. (2012) finds that household gasoline price elasticities are higher for households with better access to public transit service. The authors estimate an average household short-run price elasticity<sup>133</sup> of -1.23 for a sample of households that had good access to public transit.

The third study is by Tanguay and Gingras (2011) using Canadian data. They find that increases in fuel prices have contributed significantly to reduce urban sprawl in the 12 largest Canadian metropolitan areas over the period 1986-2006. On average, a 1% increase in gasoline prices has caused a 0.32% increase in population living in inner cities, and a 1.28% reduction in low-density housing units.

Taken together, these studies suggest that fuel tax hikes could reduce driving in the GTHA considerably, particularly in regions with good public transit service. The reductions are likely to be larger if fuel tax revenues are invested in public transit service than if they are spent on roads.

131 The federal excise tax is \$0.10/litre and the provincial excise tax is \$0.147/litre. On November 24, 2012, the mean price of gasoline in Toronto was 124.278 cents per litre (<http://www.torontogasprices.com/>). HST at a rate of 13 percent is levied on the full retail price. The average tax paid was therefore  $\$0.247 + (0.13/1.13) * 124.278 = \$0.3900/\text{litre}$ . Fuel tax elasticities are computed by multiplying price elasticities by the ratio of the tax to the pump price which is about 0.31.

132 The same is true of diesel taxes. The fuel tax base is slowly eroding as average vehicle fuel economy improves, and electric and hybrid vehicles enter the marketplace. This erosion is partly offset as the population grows and the number of registered vehicles increases.

133 This estimate is obtained for their instrumental variable estimate computed at the mean value of vehicle miles traveled.

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## Assessment of fuel taxes

Fuel taxes have good and bad efficiency properties. They are an ideal instrument for internalizing the costs of greenhouse gas emissions because emissions are proportional to the amount of fuel burned. Furthermore, as noted above fuel taxes can have a substantial effect on distance driven. But fuel taxes are a blunt instrument for targeting the costs of congestion and other externalities that vary strongly with location, time of day and population density. According to most estimates, the combined costs of these externalities greatly exceed the costs of climate change.<sup>134</sup>

If fuel taxes are raised substantially within the GTHA only, motorists will have an incentive to fill up elsewhere. This would reduce the amount of tax revenue collected in the GTHA while increasing driving because of the greater average distances traveled to buy gas. Shopping around for cheaper fuel is a problem for TransLink, the regional transportation agency for the Greater Vancouver Regional District, which imposes a \$0.17/litre tax on gasoline within the District to fund public transit. The problem would presumably be less significant for the GTHA if the tax were a smaller amount.<sup>135</sup>

Fuel taxes are generally viewed as cheap to collect. It is often stated that fuel taxes in the United States cost only about one cent to collect per dollar of revenue gained.<sup>136</sup> Estimates for Canada could not be found.

Fuel taxes score relatively poorly in terms of accountability and transparency. First, the tax rates are not set (at least intentionally) at levels that reflect scarcity of road capacity, and therefore do not help to identify which parts if any of the road network warrant expansion. Second, only a small percentage of federal and provincial fuel tax revenues is dedicated to local roads. Third, the money dedicated to public transit does not directly benefit drivers who pay the taxes (thereby violating the user-pay principle) although drivers do benefit indirectly from reductions in traffic congestion as well as better transit service to the extent that they choose to use it.

134 See Small and Verhoef (2007, Table 3.3) and Parry, Walls and Harrington (2007) for U.S. estimates, and Transport Canada (2008) for Canadian estimates.

135 As noted below, City of Toronto (2012) assumed a tax of \$0.10/litre.

136 This claim has recently been challenged by two sources. According to IBTTA (2012, p.4), the collection cost in the United States is actually 2% and rises to 7% after accounting for lapse in enforcement, fraud and abuse. Fleming et al. (2012) observe that official collection-cost estimates exclude the time and costs of recording and reporting motor fuel taxes, and the time and costs incurred by tax-exempt users of recording, summarizing and submitting rebate claims. Fraud and abuse also raise the effective collection costs. Based on rough estimates, Fleming et al. conclude that fraud and abuse alone increase the cost to 4-5% of revenues.

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An increase in fuel taxes is not logistically difficult to implement since taxes are already in place, and both fuel suppliers and drivers are familiar with them. A regional fuel tax for the GTHA could be piggybacked onto the existing provincial tax with the province collecting the revenue and remitting the regional portion to the GTHA governing body. To maintain accountability, the body governing the GTHA tax should be responsible for setting the tax rate.

Fuel tax revenues are reasonably predictable over the short run although fuel sales do fluctuate with the state of the economy as happened during the 2008-09 recession. Fuel taxes score less well on long-term sustainability as average vehicle fuel economy improves, and electric and hybrid vehicles enter service. The yield from a tax is proportional to the volume sold. According to Toronto Parking Authority (2007), it is estimated that 2 to 3 billion litres of fuel are sold annually in Toronto.<sup>137</sup> Taking the midpoint of 2.5 billion litres, a tax increase of two cents per litre would therefore raise somewhat less than \$50 million in revenues because sales would decline following a tax hike. The recent City of Toronto (2012) staff report estimated that a tax of \$0.10/litre would generate \$500 million annually for the City.<sup>138</sup>

It is difficult to assess the horizontal or vertical equity effects of fuel taxes or, indeed, the effects of other transportation funding instruments. As discussed in Transportation Research Board (2011) and Lindsey (2011), it is hard to identify the relevant dimensions of equity and hard to measure them. Impacts such as long-term changes in land use and residential density are difficult to model, and empirical studies are challenging because adjustments are gradual and other changes usually occur whose effects are difficult to disentangle. The overall welfare effects also depend on how revenues are allocated between public transit and roads, and where expenditures are made within regions.

It is fair to say that fuel taxes are horizontally equitable insofar as payment increases with distance driven. Although fuel taxes are generally considered regressive (i.e., vertically inequitable), this situation may not be the case in regions with good public transit because lower-income households generally use public transit for a larger fraction of trips than higher-income households.

137 Sales data for the GTHA could not be found. Provincial sales data are available at <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/trade37b-eng.htm>. In 2011, gross sales of gasoline in Ontario were 15,966 billion litres: an increase of 0.8% from 2007. Net sales of gasoline were down by 0.57%. Net sales of diesel oil were 5,021 billion litres in 2011, down 6.68% from 2007.

138 It is not clear what tax base was used for this estimate.

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## 6.2 Vehicle levies

Vehicle levies are fixed charges on vehicle ownership that do not vary with vehicle usage. Vehicle levies include registration fees which are levied annually in Ontario.<sup>139</sup> Under the authority of the *City of Toronto Act, 2006*, a new \$60 annual levy called a Personal Vehicle Tax (PVT) was introduced on passenger and light commercial vehicles on September 1, 2008. In 2009, the PVT generated \$50.9 million in net revenues (\$51.7 gross revenues less \$0.8 million in fees and administration costs).<sup>140</sup> The revenues were not dedicated to transportation infrastructure. The PVT was terminated on January 1, 2011, by the City of Toronto.

TransLink, the regional transportation agency for the Greater Vancouver Regional District (GVRD), also has legislative authority to levy charges on motor vehicles. TransLink attempted to do so in 2001. The GVRD approved the proposal, but it was abandoned when the provincial government and TransLink failed to agree on how to collect it. The charge would have yielded about \$100 million in annual revenues. In 2010, TransLink tried again with a proposed Transportation Improvement Fee on vehicles to fund local transportation investments. The fee would vary with vehicle fuel efficiency. The proposal has not gone forward.

### Assessment of vehicle levies

There has been little research on how vehicle levies affect vehicle ownership or usage decisions.<sup>141</sup> A modest levy, such as the former \$60 Personal Vehicle Tax in Toronto, is unlikely to have much effect on ownership, and virtually none on usage. A fee based on fuel efficiency such as the proposed Transportation Improvement Fee in Vancouver might have some influence on choice of vehicle type. So might an *ad valorem* fee based on vehicle purchase cost. Nevertheless, small and fixed levies in whatever guise (regular registration fees, Personal Vehicle Tax, or Transportation Improvement Fee) do little to modify travel behaviour because they are unrelated to usage. A levy could be limited to residents living in areas that are well served by public transit. Such a levy might increase the incentive to use transit, but it would have a narrower base.

Vehicle levies are transparent because of the clear link between payment and the right to drive. The 2008-2010 Personal Vehicle Tax was not dedicated to transportation infrastructure, and in this respect it was not accountable. A municipal registration fee is relatively easy to administer and evasion is difficult. According to City of Toronto (2010) figures, the cost of collecting the Personal Vehicle Tax in 2009 was only about 1.5% of the revenues.

139 Registration fees were increased in 2012 after remaining constant for 15 years (Ministry of Transportation – Ontario, 2012).

140 City of Toronto (2010).

141 Litman (2012c) briefly reviews studies that examined the effects on vehicle ownership of fuel taxes, income, population density, and access to other transport modes.

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Vehicle registration fees are a fairly stable and predictable source of funding. In 2009, the Personal Vehicle Tax yielded about \$50 million in revenues. The City of Toronto (2012) estimated that a vehicle fee of \$100 would yield \$300 million per year in revenues. If higher rates were imposed, the yield would rise nearly in proportion to the average fee paid per vehicle. However, to the extent that a fee has any effect on vehicle ownership and usage, it would reduce revenues from usage charges including fuel taxes, parking fees and tolls.<sup>142</sup> If a levy were based on fuel efficiency or emissions, revenue would decline as efficiency of the vehicle fleet improved.

Vehicle registration fees are fair in terms of horizontal equity within the region where they are applied because all motorists are obliged to pay them. However, motorists living outside the region escape payment. Fees are regressive with respect to vertical equity if they are imposed at a flat rate, but less so for an *ad valorem* approach or, possibly, if differentiated by fuel efficiency.

### **6.3 A regional sales tax**

In Canada, municipal governments and their affiliated special purpose agencies rely on property taxes and user fees as their primary source of locally generated revenue. In many countries, however, the situation is quite different. Municipal governments also have access to local income taxes and/or local sales taxes.<sup>143</sup> A regional sales tax could be used to supplement the property tax, or it could replace some of the property tax revenues that are currently directed to roads and transit in the GTHA. A regional sales tax would offer some advantages. First, as long as roads and transit are fully or partially funded from local property taxes, visitors and commuters escape paying taxes for these services even though they are almost certain to use them. Broadening the local tax base to include sales would help address this distortion.

Second, to improve the economic efficiency of the sales tax and to minimize the impact on cross-border shopping, work and business location decisions, it is important that it be implemented at the regional level. As noted earlier, a key tenet of the benefits model of local government finance is that those who enjoy the benefits of local services should pay for them. Some U.S. evidence suggests that the cost of inner-city services including roads and transit used by people who live in the suburbs and commute to work (in the city centre) exceeds, sometimes substantially, the taxes they pay for inner city services.<sup>144</sup> For funding roads and transit, a regional sales tax could be more effective than the property tax at linking the costs to the beneficiaries of these services.

142 Interdependence of revenues is discussed in Section 8.1.

143 Kitchen (2010).

144 Chernick and Tkacheva (2002) and Chernick (2002).

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Third, access to a regional sales tax would increase the revenue yield of the local tax base and allow it to adapt more easily to rising costs and service demands. By comparison, the property tax is a fairly stable source of revenue because it does not increase very quickly in times of economic growth or decrease very quickly in times of economic slowdown.

To maintain accountability in local decision-making, the governing body in the GTHA should be responsible for setting the tax rate.<sup>145</sup> Giving it this power would allow the municipal government to predict revenues more accurately, and give it the flexibility to change the rate in response to evolving local circumstances which could differ from conditions at the provincial and national level.

The HST rate in Ontario is now 13%. Before the conservative government was elected in 2006, the rate was 15%. If the GTHA were permitted to add a one or two percentage point increase to the HST, the rate would not exceed the rate in effect before 2007. Two recent studies have estimated the annual revenue yield from a 1% sales tax in the City of Toronto to be \$1 billion or \$1.3 billion.<sup>146</sup> A modest sales tax increase would therefore go a long way towards meeting the \$2 billion in additional revenues needed to finance The Big Move.

A regional sales tax should be relatively easy to implement and administer if it were “piggybacked” onto the existing HST.<sup>147</sup> There are two ways in which this might be done. If a higher tax rate were implemented in the GTHA than in the rest of Ontario, input tax credits for goods and services produced and sold in the GTHA would be higher than in the rest of the province. This situation, however, would be no different than the current situation where we already have different HST rates in Quebec and Atlantic Canada than in Ontario. Similar differences exist between Ontario’s HST and the western provinces with only the GST.

If there is concern about having different tax input credits in the GTHA vis-à-vis the rest of the province, the governing body for the GTHA could implement a regional sales tax as an “add-on” to the HST, but without the provision for permitting an input tax credit. This action would have the same effect as the previous retail sales tax, but the rate would be very low, and those disadvantaged by it might deem it to be a useful substitute for greater reliance on the property tax. This tax could appear as a separate line item on the sales tax receipt.

145 See Section 7.2 for a more general discussion of this point.

146 Toronto Board of Trade (2010) and City of Toronto (2012) respectively.

147 Implementation would require provincial and possibly federal approval with the Canada Revenue Agency (CRA) collecting the tax and remitting it to GTHA's governing body.

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## 6.4 Public-private partnerships (PPPs)

Public-private partnerships (PPPs or P3s) are often viewed by politicians as a way to raise money for cash-strapped governments faced with significant road and public transit infrastructure projects.<sup>148</sup> Such enthusiasm, however, must be tempered with the reality that P3s are not a source of free money since the private partner must be repaid for any financing it provides. The following quote illustrates this well:

“Smart governments have come to realize that to rely on a P3 for purely financial reasons is a bad reason. As a method to raise funds, P3s can run into the trap of so-called asset monetization, whereby a government off-loads onto a private partner the operation and maintenance of a transport asset simply in order to raise cash for immediate use or balance sheet embellishment”.<sup>149</sup>

A P3 is a contractual arrangement between the public sector and a private provider. The public sector’s role is to facilitate, regulate, and guarantee provision of an asset, and the private sector’s role is to do one or more of the following with the public sector picking up whatever the private sector does not do – design, finance, build, operate, and maintain the infrastructure in a formalized partnership agreement.<sup>150</sup>

P3s vary widely in structure, but the most common models or variations include:<sup>151</sup>

- Design-Build (DB). The private sector designs and builds the infrastructure for a fixed fee and transfers it to the public sector. The risk of cost overruns is borne by the private sector.
- Operation and Maintenance (O&M). The public sector owns the infrastructure, but the private sector operates it for a specified term.
- Design-Build-Finance-Maintain-Operate (DBFMO). The private sector looks after everything including design, building, financing, and provision of management services and operations under a long-term agreement.

148 Dornan (2012) and Gee (2012).

149 Gómez-Ibáñez (2011).

150 TD Bank Financial Group (2006), Vander Ploeg (2006) and Vining and Boardman (2008).

151 Lewis and Tomaszewska (2011) and Ontario Ministry of Infrastructure (2012).



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As of November 2012, Ontario had completed (or was involved in) 79 capital projects worth about \$30 billion using the alternative financing and procurement (AFP) method.<sup>152</sup> It has been estimated that these AFP projects will generate value for money savings of about \$3 billion. Five of these projects have involved light-rail transit (LRT) lines and three have involved highway extensions or widening.<sup>153</sup>

Policy makers and practitioners generally acknowledge that P3s can generate significant efficiencies, better cost controls, stronger operational knowledge, and greater operational flexibility when used to deliver projects that have passed a rigorous and thorough value for money assessment (VfM).<sup>154</sup> A VfM compares the net present value (NPV) of the P3 option with the NPV of a comparable project delivered through conventional procurement methods.<sup>155</sup> While not a straightforward or easy task, the VfM is intended to capture all quantitative and qualitative factors affecting both costs and benefits.<sup>156</sup> A critical issue in this calculation is the way in which risks are assigned to the public and private operators.

Two recent survey papers have examined the success of a number of P3s in Canada. Vining and Boardman (2008) included 10 case studies of P3s across Canada. It concluded that “Canadian governments have sometimes found it difficult to effectively reduce either their total costs (that is, the sum of production and transaction costs) or their budgetary risk exposure (by transferring revenue risk) through the use of P3s”.<sup>157</sup> This led the authors to conclude that P3s are not socially desirable for all public infrastructure projects, but may work well under certain circumstances; for example, where governments have not attempted to transfer revenue risk (uncertainty over future revenue streams) to the private sector; where projects have required specialized knowledge that the public sector lacks; and where governments have been able to transfer construction risks (cost overruns and construction delays, for example) at something close to a fixed price. These projects are close to design-build or build contracts, thus suggesting that governments should limit their P3 initiatives to infrastructure projects of this type or else do a much better job of reducing transactions costs in contract design.<sup>158</sup>

152 An AFP is what Ontario refers to as a public-private partnership.

153 Ontario Ministry of Infrastructure (2012).

154 Conference Board (2008), Murphy (2008), Lewis and Tomaszewska (2011) and Meaney and Hope (2012).

155 Conference Board (2008).

156 Partnerships Canada is a federal agency that assists federal infrastructure authorities in traversing the tricky P3 terrain including the calculation of VfM assessments. Infrastructure Ontario performs the same role for potential P3s at the provincial and municipal level.

157 Vining and Boardman (2008, p.11).

158 Vining and Boardman (2008).

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A second and more recent study by Siemiatycki and Farooqi (2012) conducted a VfM assessment for 28 provincially approved P3 projects in Ontario from 2007 to 2010. This study noted that the base cost of P3s was, on average, 16% higher than conventional tendered contracts. This was attributed to higher interest rates paid by private borrowers and a premium for taking on greater project risks arising from potential cost overruns, construction delays and so on. Transaction costs for lawyers and consultants added another 3% to private-sector costs. Conventional government procurement practices also face a number of risks. As with P3s, these include cost overruns, construction delays, design flaws, and fluctuating revenues. To account for these risks and to attempt to establish a level playing field for comparative purposes, a risk premium that averaged 49% of base costs was added to the more conventional alternatives. It was this risk premium that drove the VfM in favour of a P3 for each of the 28 projects. A major concern here is that there is no empirical evidence to support such a large risk premium. Siemiatycki and Farooqi emphasize this concern and it has also been highlighted by Ontario's Auditor General.<sup>159</sup> Hence, no one really knows whether Ontario's taxpayers have been and are getting the best value for their money under a P3.

Canadian experience with P3s in the transportation sector is relatively limited by international standards. A P3 was used for the Confederation Bridge linking New Brunswick and Prince Edward Island, and it has been judged as a success.<sup>160</sup> As noted above, the Province of Ontario is currently using alternative financing procurement (AFP) for five LRTs and three road expansions and widenings. The municipal sector, where most road and public transit infrastructure needs exist, has virtually no experience with P3s, although the federal (PPP Canada Inc., a crown corporation) and provincial governments (Infrastructure Ontario) have programs in place to assist with and evaluate the merits of P3s/AFP.

Based on existing experience, municipal infrastructure projects that may be suitable for a P3 include roads and public transit<sup>161</sup> as long as they can pass a rigorous and carefully constructed VfM assessment. A P3 may be most appropriate when outputs can be clearly defined<sup>162</sup>, where risks are correctly assigned to each party<sup>163</sup>, where proper incentives can be introduced for encouraging private partners to get better value and if there is clear communication and accountability between the private and public partners. Where P3 contracts are properly structured and based on performance measures, they can lead to improved local governance including increased accountability, transparency, and value for money.

<sup>159</sup> McKenna (2012).

<sup>160</sup> Conference Board (2008).

<sup>161</sup> Hrab (2003) and Conference Board (2008).

<sup>162</sup> Grimsey and Lewis (2004).

<sup>163</sup> Ugate, Gutierrez and Phillips (2012).

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Because P3s are monopolistic in nature, there is a role for government in monitoring their behaviour. Governments should set the terms and conditions for service delivery, funding and quality of service, and establish performance standards or measures. Government could even provide the pricing structure to be used for services provided by the infrastructure (volumetric pricing for water and sewers, tolls and other charges for roads and public transit, user fees for solid waste disposal) or set up a price regulation or monitoring system.<sup>164</sup> Determining optimal prices for services, however, is particularly tricky for road and public transit networks when some links cannot be priced efficiently, or if control of the network is divided among multiple governments or institutions.<sup>165</sup>

Letting a private partner operate a P3 can raise transactions costs because of the need to monitor service quality. However, it has the potential advantage that user fees are more politically acceptable because the public expects private-sector services to be priced.<sup>166</sup> Prices should be regulated in such a way that they do not prevent flexible or innovative pricing structures, such as time-dependent highway congestion tolls.<sup>167</sup> An alternative to direct toll regulation is to require the private partner to maintain traffic volume at, or above, a minimum level. This type of regulation is used on Highway 407, and it incentivizes the private partner to minimize the present-value sum of construction, maintenance and travel delay costs over the facility's lifetime.<sup>168</sup>

164 Kitchen (2006).

165 Lindsey (2012).

166 Vining and Boardman (2008). For example, according to Dadson, Fleck and Tencer (1999), "The CAA and others who oppose tolling at a municipal level make an exception for such initiatives conceived via public-private partnerships: in this situation, tolls would be considered an acceptable fee for a provided service, and not an additional tax" (web document; no page). As another possible example, the British government is considering ways to use private finance to build new motorways and expand existing ones, and then allow private managers to toll them (Kirkup and Millward, 2012).

167 Small (2010) and NCHRP (2012).

168 Guo and Yang (2009).

## 7.0 GOVERNANCE CONSIDERATIONS

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This section of the report looks at four aspects of governance. First, it addresses the question of which level of government should be responsible for formulating and implementing revenue-generating or other transportation-related policies. It also considers whether decision-making should be centralized or decentralized between sectors and between regions. Section 7.2 covers specific governance considerations in the GTHA. Section 7.3 examines whether revenues from transportation funding mechanisms should be dedicated for any specific purpose (e.g., to local transportation, or a particular transit line). Finally, Section 7.4 reviews public attitudes in the GTHA towards funding mechanisms.

### 7.1 Policy integration<sup>169</sup>

How policies should be implemented and services provided can be viewed from the perspective of federalism, which concerns how responsibility for providing public goods should be divided between federal, provincial, and local governments. A large literature, dating back to Tiebout (1956), has assessed the advantages and disadvantages of local government vis-à-vis central governments.<sup>170</sup>

The main strength of local governments is that they can accommodate individual preferences for public goods such as roads and parks. Local governments compete to attract residents and firms by offering different packages of services and taxes. Local governments are usually more in tune with local preferences, and hence more able to get the most out of limited resources. As Glaeser (2012) points out, if those responsible for funding are far removed from those who will benefit from it, projects may be approved that offer little value for money.

Decision-making by local governments has three potential disadvantages. First, if local jurisdictions are relatively small, significant externalities or spillovers can occur between them. If the spillovers are positive, local governments will tend to provide too few services. If the spillovers are negative (e.g., traffic congestion and pollution), local governments will not make enough effort to contain them. Second, local governments may be unable to fully exploit scale economies in the provision of services such as rail transportation. Third, local governments have limited ability to achieve redistributive goals because higher-income citizens who would bear the costs of redistribution can move away to jurisdictions with lower taxes.

Local government is preferable to upper-level government if the advantages of satisfying diverse preferences outweigh the disadvantages of unattended spillovers, foregone scale economies, and constraints on redistribution. If scale economies are significant for

169 This section draws on text in Lindsey (2011).

170 De Borger and Proost (2012) provide a recent review of federalism from the perspective of transportation infrastructure investment.

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some services, it may be possible for one local government to contract with a higher level of government to provide the services. Alternatively, a metropolitan federation can be established to provide them. Deficiencies in provision can also be corrected using subsidies from higher-level government (cf. Section 3.3). Negative externalities such as traffic congestion, however, are difficult to correct in these ways. Consolidation or centralization of decision-making and provision of services may be the only effective solution. Transportation spillover effects generally operate at the metropolitan rather than provincial level, and metropolitan organizations are then the best level for consolidation or centralization.

This argument that regional governments are best-suited to take on responsibility for urban transportation is echoed in IMFG Forum (2012, p.3):

“Although some urban services can be provided efficiently and effectively at the municipal level, transportation spills over municipal boundaries. Without an effective regional governance structure, service provision can be hindered by political uncertainty and a lack of transparency, high transaction costs or the inability to exploit economies of scale, and administrative gaps where jurisdictional boundaries do not coincide with regional economic and service delivery patterns.”

A similar point is made by Nelson\Nygaard Consulting Associates (2006, p.iv) regarding Los Angeles:

“in a region as large and as multi-centered as Los Angeles, people’s daily trips frequently begin in one city and end in another. As a result, the best strategies for decreasing trips must include partnerships with area cities, transit operators and other agencies—it is very difficult for one city to simply ‘go it alone’, since development activity and traffic does not respect city boundaries.”

Besides negative externalities such as traffic congestion and pollution, urban areas confer substantial positive externalities; indeed, this is the main reason that cities exist. In addition to purely technological scale economies, agglomeration economies exist when the spatial concentration of economic activity creates increasing returns.<sup>171</sup> The geographical range of agglomeration economies varies, but in many cases it is believed to extend at least across urban areas. This supports the argument for establishing decision-making at the metropolitan or regional level rather than local level.

<sup>171</sup> According to Mackie, Graham and Laird (2011), estimates of these economies range from 2% to 10% for manufacturing industries, and up to 20% for some service industries. As the Conference Board of Canada (2011) explains, firms can derive productivity benefits from proximity to other firms in the same industry as well as from the scale of input, product and labour markets in large urban areas.

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Regardless of how responsibilities for transportation and related activities such as urban planning are allocated between levels of government, it is necessary for departments to communicate with each other in the appraisal, funding, and implementation of transportation policy. A substantial literature exists on institutional integration and how best to achieve it. Hatzopoulou and Miller (2008) identify four types of policy integration:

**Vertical integration** occurs between different levels of government. The emphasis is on consistent requirements and understanding between the tiers.

**Horizontal or inter-sectoral** integration involves the coverage, or span, of a given authority over the policies relevant to transportation planning (e.g., land usage, public transit and parking).

**Inter-territorial or spatial integration** occurs between neighbouring authorities that experience spillover effects.

**Intra-sectoral integration** occurs between different sections within a department.

Hatzopoulou and Miller (2008) summarize the results of interviews about policy integration that were conducted with senior transportation officials in federal, provincial, regional municipal, local municipal, and transit agencies in Canada.<sup>172</sup> Ontario municipal officials who participated in the survey identified conflicts between their department's land-use development plans and the Ontario Ministry of Transportation's road construction plans. They also noted a lack of involvement by the Province in planning, and a general lack of cooperation at the federal level. Similarly, in its 2009 territorial review of Toronto, the OECD saw a need for both vertical and horizontal integration to accomplish sustainable, region-wide economic development.<sup>173</sup>

Empirical evidence on the relative merits of centralization and integration is mixed. Decentralized systems have some advantages such as generating information, and flexibility of policy implementation including experimentation with new practices. Centralization has potential advantages in facilitating coordination of transportation-related decisions across local areas, consolidating information, and enabling a variety of policy instruments with which to pursue goals. In the case of road pricing, jurisdictional difficulties would need to be overcome because of the divergent incentives of provincial, regional, and local authorities. A number of theoretical and empirical studies have

172 The interviews were conducted in 2006 shortly before the *City of Toronto Act, 2006*, was passed and Metrolinx was created. The results should be judged with this in mind.

173 OECD Territorial Reviews (2009).

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demonstrated potential problems that arise when multiple authorities have the power to levy tolls or other user charges.<sup>174</sup>

- Local authorities may discriminate against through-traffic, or against commuters or visitors residing outside the municipality or region.<sup>175</sup>
- Local authorities may try to shift congestion to other jurisdictions. The size of the distortion depends on whether they can toll through-traffic, and if so whether they can discriminate between local and through-traffic.<sup>176</sup> These and other factors also determine whether local authorities have too much or too little incentive to build local transportation infrastructure relative to the interests of the region.<sup>177</sup>
- Local authorities controlling road links that are aligned in series tend to set tolls that are too high from the perspective of the region.<sup>178</sup> This is a concern for the eastern extension of Highway 407 since the province will control tolls on the extension, while 407 ETR will continue to operate the existing highway.

More research is needed on the virtues of centralized vs. decentralized decision-making as well as a better understanding of the nature of spillover effects and agglomeration economies.<sup>179</sup> Nevertheless, it is apparent that both investment and funding decisions are better implemented at a regional than at a local/municipal level.<sup>180</sup> This leads to the question whether some decisions should be made at the yet-higher federal level. Indeed, it is frequently noted that Canada is the only G8 country without a federal policy on public transit investment and funding.

Views differ on the appropriate scope of federal involvement, but the balance of opinion is that the federal role should be limited to providing unconditional grants to lower-level governments. This is consistent with the existing legal framework. According to the Canada Transportation Act, the federal government is responsible for international and interurban domestic transportation policies. It also sets a framework for national transportation policy. The federal government does not have jurisdiction over roads (except for highways traversing national parks and a section of the Alaska Highway) and it does not pursue a national transit policy. In its 2010 Report on Plans and Priorities, Transport Canada describes its mandate as one in which it “plays a leadership role to

174 See De Borger and Proost (2012).

175 Levinson (2001) shows how U.S. states have used tolls to extract revenue from out-of-state motorists. Proost and Sen (2006) show theoretically how a city authority can use a parking charge to extract revenue from non-residents.

176 De Borger, Proost and Van Dender (2005).

177 Westin et al. (2012).

178 De Borger, Dunkerley and Proost (2007) and Ubbels and Verhoef (2008).

179 Solé-Ollé, Stephan and Valila (2012).

180 Hunter et al. (2012).



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ensure that all parts of the transportation system work together effectively.”<sup>181</sup> The survey described by Hatzopoulou and Miller (2008) suggests that transportation officials do not think the federal government should take a lead role in coordinating urban transportation policy. The officials consider provincial agencies better suited for that role as long as they provide stable funding to lower-tier organizations.

## 7.2 Governance for the GTHA

The governing structure for new financing tools in the GTHA will depend, to a large extent, on the type of instrument implemented. For a parking levy and/or a vehicle registration charge, the decision making body is already in place. It is the existing local or regional councils. These elected councils have the power to make decisions about what should be done within their municipality. At the moment, the City of Toronto is the only municipality in Ontario that has the power to levy a parking lot tax and a vehicle registration charge.<sup>182</sup> For the rest of the municipalities in the GTHA, access to these taxes would be possible only if the Province granted similar powers.

For new area-wide taxes or charges to finance inter-regional and inter-city roads and public transit within the GTHA, there is no single governing jurisdiction in place to address issues of what should be done, how it should be done, and where it should be done. This lack of an accountable and effective regional governance structure has been identified as a major shortfall in moving forward with new and innovative financing and funding initiatives.<sup>183</sup> At the moment, there are few political incentives for the City of Toronto (the hub of the GTHA) to accommodate suburban traffic from beyond its boundaries despite the importance of these workers and their trade in Toronto’s prosperity. To overcome this deficiency, there are a few noticeably different options and, undoubtedly, there are variations on each of them. For instance, the Province could take the initiative and assume responsibility for all decisions about new taxes and/or charges. Another option could include the creation of a special purpose body with responsibility for all decisions regarding roads and inter-municipal transit across the entire region. Still another option would be to restructure the current governing structure across the entire area. For part of the GTHA (Toronto and Hamilton excluded), the current two-tier structure of local government could be replaced by a number of single tiers. There might

181 Transport Canada (2010b, p.3).

182 The *City of Toronto Act* prohibits Toronto from taxing income, wealth, gas, and general sales, but it permits the City to tax alcoholic beverages and entertainment establishments, motor vehicle ownership, land transfers, parking lots and billboards. The City is also allowed to introduce road pricing. Of these options, the City implemented a motor vehicle ownership tax and a land transfer tax in 2008. In 2011, it terminated the vehicle ownership tax (cf. Section 6.2).

183 IMFG Forum (2012).

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be one for each existing region, or more than one in each of the regions. A new regional tier could then be added with responsibility for a number of area-wide services including roads and region-wide transit. Each of these options is examined briefly.

### **Provincial responsibility**

If the Province were to assume all spending responsibility for inter-municipal transit and highways in the GTHA, then it should assume all funding responsibility including both implementation and administration of new taxes or charges. This option, however, is not without its faults. If money for rapid transit, highways, and GO Transit is raised in the GTHA as it should be, and all policy decisions are made by provincially elected representatives – many of whom represent areas outside the GTHA region, one may very well ask “why should non-GTHA legislators have the authority to make decisions about taxes levied exclusively within the GTHA?” This structure ignores a “fundamental principle of good governance: no taxation without representation.”<sup>184</sup> A variation of this option might include the establishment of a committee of provincially elected GTHA members tasked only to establish regional transportation policy. This is far from problem free, however. Provincial politicians are elected to address provincial issues (health, education, the judicial system, province-wide transportation and so on) and not local or regional issues. For the latter, we have local councils composed of locally elected politicians. As well, decisions over local and regional funding for roads and public transit can affect the way in which local taxes and charges are used to fund other services. For example, if the Province were to implement a regional sales tax to fund roads, this might preclude the use of regional sales taxes to fund other local and regional services that could be funded this way.

### **A Special Purpose Body**

Metrolinx is a special purpose body (SPB) or agency that was created by the Province to improve the coordination and integration of all modes of transportation in the GTHA. Crucial to its success was the development of a regional transportation plan<sup>185</sup> designed to provide a seamless and integrated transportation network throughout the GTHA. This plan concluded that the province’s major roads and transit problems are regional in nature and cross municipal boundaries.

In 2009, Metrolinx merged with GO Transit, the regional public transit service. In 2010, the Air Rail Link was added to Metrolinx’s responsibilities. When completed, this will be a premium express rail shuttle service between Union Station in downtown Toronto and Pearson Airport. In 2011, Presto was added. This is a new electronic fare card that allows riders to transfer seamlessly across multiple transit systems (cf Section 3.2).

184 Globe and Mail (2012a).

185 “The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area” (Metrolinx, 2008a).

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The board of Metrolinx is made up of 14 provincial appointees, generally drawn from the private sector. No municipal or provincial politicians serve on the board. The board, however, does not have any real decision-making power on policies directly affecting the financing of roads and public transit. It can and does advise the Province on what should be done. Indeed, this is a major driver behind its investment strategy which is to be released in June 2013.

To increase the power of the current board, one option would be to change the legislation to give it decision-making powers over all fiscal matters, both spending and revenues. This change, however, could create problems as long as board members are appointed. To put it bluntly, it is undemocratic to let appointed officials make decisions on expenditures funded by tax dollars, special charges, and fees. Accountability is missing when taxpayers cannot vote for those who make policy decisions. As well, appointed officials often create an environment in which the special purpose agency becomes detached from taxpayers or users paying for the service.<sup>186</sup>

In short, any SPB that is responsible for public-sector spending and taxing/charging decisions that affect peoples' working and living environments must be made up of "elected" officials. The next issue, then, is whether board members should be directly elected to the board or whether they should be elected to municipal or regional councils initially, and by virtue of this appointed to the board. This latter option was the model used for selecting most of the board members on the Greater Toronto Transportation Authority (GTTA), the governing body that preceded Metrolinx. It is also the model used at TransLink in Metro Vancouver. The practice of serving on a municipal council and a special purpose agency at the same time is defended on the grounds that it provides for strong communication between the special purpose agency and the municipalities and regions because the same individuals are on both governing bodies.<sup>187</sup> Communications between the two bodies, however, may be achieved through administrative arrangements.

Problems often surface when elected officials serve on a local council and a special purpose agency at the same time. Accountability becomes entangled when citizens/voters are unable to separate their vote for municipal/regional issues from their vote for SPB issues. For example, suppose a taxpayer is happy with a councillor at the municipal/regional level but not as a member of the SPB (or vice-versa). For whom is he or she voting at election time – is it the individual as a municipal/regional councillor or as a member of the SPB? A further criticism of officials serving on both bodies is that the SPB often becomes the instrument or agency of local councils. This electoral system has the potential for parochialism in decision making, and hence not being directly accountable to taxpayers/voters.<sup>188</sup>

186 Kitchen (2002).

187 This is an example of vertical integration, mentioned in Section 7.1.

188 Kitchen (2006).

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Directly elected members of SPBs are preferred because accountability is enhanced when each member represents area-wide issues only. Those charged with the responsibility for making GTHA-wide decisions have an opportunity to present their ideas about GTHA road and transit issues directly to the public, and to hear clearly their responses without confusing the issues with matters of concern for local and regional councils. Elected members to an SPB can be assessed by the electorate on the basis of their performance on the SPB and will be less likely to face conflict between GTHA and local interests. Members of an SPB will be able to focus their energies entirely on area-wide issues. The potential for parochialism is reduced and the electoral process is simplified with separate slates of candidates for each governing unit.<sup>189</sup>

It has been suggested that appointed officials with expertise in road and public transit financing should govern an SPB for roads and public transit in the GTHA. This option, as was noted above, violates the principle of accountability. Clearly, an SPB should be governed by directly elected officials with professional expertise coming from direct employment as a member of the bureaucracy that makes recommendations to the governing body or as direct advisor to the governing body itself. The latter option is the practice in Metro Vancouver, where the Mayor's Council on Regional Transportation (made up of 21 mayors who choose their chair) provides TransLink's governance. This body is supported or advised by a of directors (appointed by the Mayor's Council) and the Regional Transportation Commissioner (also appointed by the Mayor's Council).

Even though directly elected board members are the preferred choice for the governing structure of an SPB, SPBs as governing bodies are far from ideal. They often lead to fragmentation of local government services into a number of disparate and independent governing units. This inhibits municipal administrative integration and coordination. Attempts by municipally elected politicians to provide services are often thwarted or impeded because of decisions made by an SPB over which municipal politicians have little, if any, control. For instance, actions taken by a roads and public transit authority may conflict with a municipal and regional council's overall planning objective. Similar problems exist for other SPBs.

If an SPB were responsible for all inter-regional public transit, arterial roads, and highways, it would follow that it should assume responsibility for both spending decisions and revenue raising options. On the spending side, this would mean that it should determine infrastructure needs and how they are to be financed. On the revenue side, it should assume power for determining how the capital and operating costs are to be funded. This might include the use of a GTHA-wide property tax if some costs are to be financed from the property tax<sup>190</sup>, but it should also include the power to

<sup>189</sup> Kitchen (2008, 2013a).

<sup>190</sup> Public transit, with the exception of GO Transit, and arterial roads are partially funded from local and regional property taxes (cf. Section 3.1).

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implement an area-wide dedicated fuel tax, perhaps a regional sales tax and some form of road pricing. All of this could be done with further changes to the current *GTTA Act* (Metrolinx) including new sections on legislation and the enactment of new regulations.

While arguments for a separate SPB for roads and inter-regional transit across the GTHA are weak, an SPB may be necessary (often referred to as a second-best option) because there is no existing region-wide municipal decision-making body that can make spending and taxing/charging decisions on roads and public transit. This SPB could be Metrolinx with broader legislation and expanded powers and a Board made up of directly elected members.<sup>191</sup>

### **Restructured municipal governance**

The current structure of two single-tier cities, four regional governments, and 24 cities, towns, and townships in the regions has served the people reasonably well over the past four decades, but times have changed. An area that once comprised a set of rather distinct and independent regions (and municipalities within these regions) has evolved into an area with regions that are much more integrated and interdependent. Population growth, increasing density, and a tendency for people to live in one jurisdiction and work in a neighbouring jurisdiction has effectively removed inter-municipal differences due to local preferences. Resident expectations across the entire area have become more uniform with respect to both the quantity and quality of public services.

For a variety of reasons it may be impractical to exclude major urban centres from the governing structures used for smaller urban centres, or rural and tourist areas. Urban areas, especially major urban areas, are the focal point for most economic, business, recreational, and social activity across a large geographical area. Consequently, it is necessary to maintain a coherent balance among policies for the entire area. Common transportation challenges arise in urban and rural areas. Social services and social housing should be coordinated between urban and rural areas to deter recipients from migrating to the urban centre in order to receive such services. Region-wide land-use planning is also important if both rural and tourist communities are to retain their identities and resist the temptation to urbanize and generate increased property assessed values and higher property taxes. Rural areas around an urban-centred jurisdiction generally have better arterial roads, more recreation programs, enhanced library services, and better fire protection and safety standards, to name only a few, when compared with municipalities that are not part of an urban/rural governing structure.

Given that the GTHA has changed considerably in the past four decades, the time may have come to re-examine the governance structure of the entire area, not only for roads and public transit, but for other municipal public services as well. Change could take a

191 Gerard Kennedy, a candidate for the Ontario Provincial leadership, suggested this as a way of streamlining efforts to improve public transit in the GTA; see Brennan (2013).

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variety of forms, but one common ingredient seems to be the creation of a regional or metropolitan government across the GTHA<sup>192</sup>, much like the regional level in the existing two-tier regional structures. This layer could be responsible for major services including inter-municipal public transit, arterial highways and roads, social services, area-wide land use planning, solid waste disposal, and other services deemed to be best handled at this level. This regional government should have its own directly elected council with the power to make policy decisions for services assigned to it.

To avoid another layer of government across the existing four regions (Halton, Peel, York, and Durham), each of the current two-tier structures could be collapsed into a single tier. This could be done by merging each of the existing regions and their area municipalities into one governing structure. These four newly created local governments, plus Hamilton and Toronto, would make up six area municipalities in the newly proposed regional structure. Or, it could be achieved by transferring all regional services to the existing area municipalities and having 24 local governments. When combined with Hamilton and Toronto, 26 municipalities would constitute the area municipalities in a new regional structure. A version of the latter option might include the merger of some of the 26 municipalities to create fewer area municipalities within the GTHA, but more than six. In short, each of these options would create a new regional governing structure.<sup>193</sup>

Of these possibilities, perhaps the best would be to create a single tier in each of the four regions. Between 60% and 68% (depending on the region) of all operating expenditures are currently at the regional level.<sup>194</sup> Assigning the remaining responsibilities to the regional level would be considerably easier than carving up the existing regional services and apportioning them to the area municipalities. Indeed, the trend over the past two decades has been to migrate services from the area municipalities to the regional level rather than from the regional level to the area municipalities. Another advantage of using the current region as a governing jurisdiction is that all regional services are currently provided in a seamless manner across each region, whereas this advantage would be lost if regional services were transferred to the area municipalities. Finally, single tiers have already been created for Hamilton and Toronto.

The objective of achieving an accountable and efficient local governing structure for all local public services is best met if all local public sector decision-making powers are left with a democratically elected local council. A new GTHA-wide regional structure that is responsible for all area-wide services including roads and public transit should avoid many of the shortfalls generally associated with a special purpose body. This would

192 Maclsaac (2012).

193 Kitchen (2008, 2013a).

194 Calculated from annual publication of the *Financial Information Returns*, Ontario Ministry of Municipal Affairs and Housing, Toronto.

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create an environment where it would be easier to coordinate all municipal services and functions and it would minimize instances where the policies and decisions of the SPB conflict with the policies and decisions of local council. In principle, a system where local council has responsibility for making the appropriate trade-offs between all local expenditures reduces the possibilities of conflict between an SPB seeking to promote its own special interests and the local council attempting to hold the line on taxes, restricting expenditures or altering expenditure choices among those services over which it has substantial control. Finally, opportunities to benefit from economies of scale in administrative functions will be improved.

Putting all municipal decision-making powers under council control should improve local accountability and responsiveness to the tax-paying public. It would remove the difficulties often encountered when independent SPBs enact policies that inhibit the way in which other municipal services are funded, how the area is governed, and how and where it develops residentially, commercially and industrially.<sup>195</sup>

This governing structure is probably the best option, although it is unlikely to be considered in any serious manner in the current political environment. The provincial government in Ontario has shown no interest in municipal restructuring initiatives, and restructuring will not happen if municipal governments are left to do it themselves. Having noted this constraint, however, it does not mean that it should not be considered. Initiatives to change take time to percolate, and some take more time than others.

### **7.3 Dedicating revenues**

As discussed at length earlier in this report, revenues to finance road and public transit investments can be raised from diverse sources including user fees (transit fares, parking fees, and road tolls) and instruments such as sales taxes that are not directly related to usage of either public transit or roads. This section addresses whether revenues should be dedicated to investments and other expenditures in any particular way.<sup>196</sup>

Views on dedication differ.<sup>197</sup> Public finance theorists are critical of dedication because needs change in unpredictable ways, and revenue shortages can arise for some purposes and surpluses for others. There are four main arguments for dedication, however: it is consistent with the beneficiary principle, it facilitates long-term planning, it can prevent political abuse of funds, and it tends to boost public acceptability.

In the case of road pricing, revenues can be dedicated narrowly – such as to the highway

<sup>195</sup> Kitchen (2006).

<sup>196</sup> Dedication is sometimes referred to as earmarking or hypothecation. Bös (2000) provides a theoretical discussion of dedication. de Palma, Lindsey and Proost (2007) and Lindsey (2007, 2009) discuss dedication of toll-road revenues.

<sup>197</sup> See, for example, [The New York Times, Opinion Pages](#) (2012).



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on which tolls are levied, or more broadly – such as to highways in the area or public transport services in the same corridor. Revenues from existing road-pricing schemes are dedicated<sup>198</sup>, but dedication is not common in Canada other than for P3s where toll revenues are used to compensate the private partner for financing and/or operations.

Most recent road pricing studies consider public acceptability to be the main remaining barrier to implementation, and they advocate dedication of revenues in some way. A common view is that road pricing schemes must create more winners than losers. Public choice theory suggests, however, that people and institutions do not bother to support or oppose initiatives unless they think they stand to gain or lose a significant amount. King, Manville and Shoup (2007) draw on this idea to argue that the benefits from road pricing should be concentrated, and the losses dispersed, so that the perceived winners will support pricing while the perceived losers will remain quiet. To accomplish this they recommend that toll revenues be given to local governments where highways pass through. They argue that this is fair because these cities bear the local external costs of a regional highway system. They also argue that it is effective because cities are already an organized and effective lobby group, and are likely to fight hard for new sources because they have few means of raising revenues. The King, Manville and Shoup (2006) proposal is novel in that it does not advocate spending revenues in any particular way, but rather dedicating revenues to particular institutions.

At least in the case of road pricing, the balance of opinion appears to be that dedicating revenues is desirable. This of course assumes that dedication is both legally possible and will work as intended. Yet dedication can fail in two ways. One is when the money from a new source is intended to supplement existing sources so that more can be spent for the target purpose. The danger is that funds from existing sources will be reduced in an offsetting way. For example, it was alleged that the U.K. government reduced its funding to London after the Congestion Charge was introduced.<sup>199</sup> In principle, this could

198 As Lindsey (2009) explains in more detail, revenues from the Norwegian toll rings are dedicated to roads, local public transport, environmental quality and safety. Revenues from the London congestion charge are dedicated to local transport until at least 2017. The 2000 UK *Transport Act* which governs authorities outside London requires that toll revenues be used to facilitate local transport plans. Revenues from the Stockholm congestion tax are devoted to roads. Revenues from both the double-cordon scheme planned for Edinburgh and the cordon scheme proposed for New York City would have been used to finance local public transport. Revenues from HOT lanes in the United States are spent on a combination of operations, maintenance and facility improvements. (On I-15 in San Diego, half the revenues are used to fund transit service in the corridor.) And in the San Francisco parking pricing experiment, revenues from parking meters, parking fines and parking garages are given to the San Francisco Municipal Transportation Agency to support transit services (SFpark, 2011).

199 Richards (2005, pp.83, 214).

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also happen in Canada with federal grants for roads and public transit infrastructure. HLB Decision Economics Inc. (2001) notes that empirical studies have identified some “leakage” of federal funds to states and local governments in the United States.

The second problem with dedication arises if a new funding source is supposed to replace existing sources to achieve revenue neutrality. The risk here is that other sources will not be reduced as proposed. This may be one reason why respondents to surveys often reject using toll revenues to reduce income and other distortionary taxes because they distrust government intentions.<sup>200</sup>

Another potential drawback of dedication is that providing extra money will weaken incentives to operate efficiently and to find ways to enhance productivity. If public transit operating budgets are increased, some of the money may be absorbed by increased payroll budgets, job guarantees and other elements of “slack.”<sup>201</sup>

#### **7.4 Public attitudes in the GTHA towards funding mechanisms**

Several polls and surveys of public attitudes towards transportation funding mechanisms have been conducted in the GTHA since the autumn of 2011. Five of them are summarized here.

##### **Environics (August and September, 2011)**

In August and September, 2011, Environics conducted a survey of 2,500 residents in the GTHA.<sup>202</sup> Many respondents (70%) agreed that government had enough money for roads and public transit and were opposed to new taxes or fees. Little support was evident for road tolls, a parking levy, a gasoline tax increase, or a regional sale tax to pay for enhanced transit service. Not surprisingly, transit users, bicyclists, and pedestrians were more favorable toward road tolls and a parking levy than were drivers or carpoolers.

200 Evidence of distrust of government is apparent from a European Commission project that examined attitudes toward ecological taxes of policy makers, business people and the general public in five member countries. Dresner et al. (2006) summarize the main findings. One was that the public does not trust governments to spend funds as prescribed. This appeared to reflect a general distrust of government and politicians in relation to taxes rather than being specific to environmental taxes. Environmental taxes were seen as a way to raise money generally, and would not be offset by reductions in other taxes. Another lesson was that public trust would be enhanced if revenues were controlled by an independent body that could certify the money was used in the intended way.

201 See, for example, De Borger and Kerstens (2008).

202 Globe and Mail (2012b).

### Angus Reid for Toronto Star (October, 2011)

In October, 2011, Angus Reid performed an online survey of 1001 Toronto-area residents.<sup>203</sup> Their attitudes towards four funding mechanisms are summarized in Table 2. The most popular mechanism was a congestion charge similar in design to the London Congestion Charge. A majority (55%) of respondents considered this a very good or good idea. Highway tolls received less support at 37%, but more than a sales tax (26%) or a 10% increase in the gasoline tax (19%). The two user charges were therefore viewed more favorably than the two taxes.

**Table 2: Attitudes towards funding mechanisms, Angus Reid for Toronto Star**

	Highway Tolls	Congestion Charge	10% Gas Tax	1% Sales Tax
Very good idea	10%	18%	7%	6%
Good idea	27%	37%	12%	20%
Bad idea	24%	15%	25%	26%
Very bad idea	30%	23%	49%	41%
Not sure	9%	7%	7%	7%
VG or Good: Bad or very bad	37% : 54%	55% : 38%	19% : 74%	26% : 67%

Source: Vision Critical Excel spreadsheet, October 31, 2011, Tables 24, 25, 26, 27; weighted sample

Another question on the Angus Reid survey asked “What percentage of transportation funding in the GTA should come from the following groups/entities?” The results are shown in Table 3.

**Table 3: Preferred contributions of transportation funding mechanisms**

Drivers	12.7%
Transit riders	13.4%
Municipal government	25.4%
Provincial government	28.6%
Federal government	19.9%

Source: Vision Critical Excel spreadsheet, October 31, 2011, Table GTA8; weighted sample

203 Kalinowski (2011).

The percentages were approximately equally distributed between user fees and each of the three levels of government (municipal, provincial, and federal).

### **Nanos/Toronto Sun Poll (March, 2012)**

On March 17 and 18, 2012, Nanos Research performed a random telephone survey of 501 Toronto residents 18 years and older.<sup>204</sup> Respondents were asked several questions about extending the Sheppard Subway and building a light-rapid transit line. One question asked, “In your opinion, how should this new transit infrastructure be paid for?” Responses are indicated in column (a) of Table 4. Nearly one quarter of respondents identified development fees as their first choice. Tolls, transit fares and new, non-property taxes received roughly 15% support each. Unlike the Angus Reid poll, user charges did not receive higher support than other sources.

**Table 4: Preferred source of transportation funding**

	<b>Nanos Research/ TorontoSun Poll (March 2012) (a)</b>	<b>Toronto Board of Trade/ Globe &amp; Mail/Nanos Research (October 2012) (b)</b>
Tolls	16.7%	27.1%
Transit fares	15.0%	12.1%
Gasoline tax		15.8%
Development fees	24.5%	
New, non-property taxes	14.4%	
Additional provincial/ federal funding	3.7%	
Other	2.8%	
Combination of options	8.5%	
Unsure	14.4%	

Source: (a) Nanos Research (2012). (b) Morrow and Grant (2012)

204 Nanos Research (2012).

### Toronto Board of Trade/Globe and Mail/Nanos Research (October, 2012)

Another random telephone survey of 1,000 residents was performed from September 29 to October 4, 2012.<sup>205</sup> Little enthusiasm was evident in this survey for either user charges or new fees for improving roads and public transit. Over a third of respondents (34%) were “outright against paying extra” for upgrading transportation while 28% were “outright in favour” of paying extra. When respondents were asked which charges or taxes they would prefer if they were forced to choose between them, their top three choices were as indicated in column (b) of Table 4. Road tolls received the highest support at 27.1%, an increase in gas taxes was second at 15.8%, and higher transit fares garnered 12.1%. Similar to the Angus Reid poll, some form of road pricing was considered favorably.

### Environics/Pembina Institute (April, 2012)

In April, 2012, Environics conducted a detailed online poll on behalf of the Pembina Institute.<sup>206</sup>

The sample was restricted to drivers who commuted at least 30 minutes each way. One question asked whether major improvements to the transportation system in the GTA should be paid for mainly through “additional taxes” or “additional transit fares, road tolls, parking and other user fees.” Over half of respondents (63%) favored user fees. Respondents were also asked to identify their preferences for specific sources of funding that would be dedicated to transportation improvements. Scores for four of the candidates are recorded in Table 5.

Road tolls, a commercial parking tax and a general sales tax each received majority support. A regional gas tax similar to the one in Vancouver received 46% support. Over half (56%) of drivers also indicated a willingness to pay \$2 per trip (method unspecified) to reduce their commute time by 30%. Over half (54%) of drivers who commute by major highway said they would probably pay to use a HOT lane.

**Table 5: Attitudes towards funding mechanisms, Environics for Pembina Institute**

	Road Tolls	Commercial Parking Tax (\$0.25-\$0.75)	Regional Gas Tax of \$0.02/l	Sales tax of 1%
Very reasonable	16%	16%	13%	14%
Somewhat reasonable	41%	42%	33%	40%
Not very reasonable	26%	25%	28%	25%
Not at all reasonable	17%	17%	26%	21%
Reasonable: Not reasonable	57% : 43%	58% : 42%	46% : 54%	54% : 46%

Source: Burda and Haines (2012).

<sup>205</sup> Morrow and Grant (2012).

<sup>206</sup> Burda and Haines (2012).

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Overall, the survey identified appreciable support for all funding mechanisms despite the fact that the sample was comprised of drivers with long commutes. The poll emphasized that funds would be dedicated to both new rapid transit and roads. As Burda and Haines (2012) remark, “It is possible that presenting a vision for the region that benefits everyone, and includes a new network of transit lines rather than upgrades, might generate a more positive response.”

Burda and Haines (2012) draw a number of additional findings from the survey, including:

- Pricing policies receive higher support if they are “fair, transparent and dedicated to building rapid transit in the region” (p.11)
- Funds dedicated to public transit in the form of “a regional network that connects communities” receive as much support as projects in the respondents’ own communities (p.20)
- Road tolls receive more support if imposed on routes with rapid transit alternatives (p.11)

In summary, the five polls summarized here do not, in aggregate, reveal a clear preference of GTHA residents for user fees versus taxes. Support for each category or mechanism can be described as something between modest and moderate. This is broadly in line with a Canada-wide online poll conducted by Leger Marketing for CBC News in November, 2011.<sup>207</sup>

As far as road pricing, attitudes in Canada have slowly been warming, but traditional objections are still apparent. The main objections are paying for something that has been free, double taxation, horizontal and vertical inequity, system complexity, invasion of privacy, and potential loss of retail business.<sup>208</sup> Consistent with these views, tolls are generally considered more acceptable for simple schemes with clear goals; on new capacity (especially if it is not otherwise built); if a reasonable toll-free alternative exists; if revenues are dedicated to the tolled facility; and if toll increases are moderate. Broadly similar attitudes in other countries have been documented for a number of years.<sup>209</sup> One especially significant finding is that support for road pricing tends to increase with experience. This has been observed for schemes ranging in scale from individual HOT lane projects in the United States to the area-based schemes in London and Stockholm.<sup>210</sup>

207 CBCNews (2011) and Hildebrandt (2011).

208 Lindsey (2007).

209 See, for example, Jones (1998), Oberholzer-Gee and Weck-Hannemann (2002), Schade and Schlag (2003), Farrell and Saleh (2005), Ubbels and Verhoef (2006), Schaller (2010), Hårsman and Quigley (2011) and Poole (2011b).

210 See, for example, Berg (2003), Albalade and Bel (2009) and Börjesson et al. (2012).

## 8.0 RECOMMENDATIONS

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The Big Move has an estimated capital cost of \$50 billion, and when completed the new transit systems and roads will require roughly \$1.5 billion annually to operate and maintain. Approximately \$2 billion per year in additional revenues will be needed for financing and funding beyond what has been secured so far. This is a significant financial gap, but there are a number of existing or potential new revenue sources that could be drawn on. According to City of Toronto (2012) estimates, the gap could be closed by implementing various combinations of sources including any two of: a 1% increase in personal income tax, a 1% sales tax, comprehensive highway tolls set at 10 cents/km, and a comprehensive parking levy set at \$1/day.

### 8.1 Interdependence between revenues

The strengths and weaknesses of a number of sources were reviewed earlier in this report. Before deciding which sources to tap, it is important to recognize that the choices are interdependent in two ways. First, the choice of funding mechanism can affect the amount of revenue required. As discussed in Section 5.5, introducing road pricing on a large scale will probably reduce optimal road capacity, and consequently the money required for road investment and long-term maintenance. It will almost certainly increase the optimal amount to spend on public transit. The same is true for increases in other road user charges.

Funding choices are also interdependent because the revenue collected from one instrument generally depends on what other instruments are also used, and at what levels. The revenues from most combinations of instruments are subadditive in the sense that an increase in one charge or tax will reduce the revenues collected from other charges or taxes. For example, because a parking levy discourages driving it is likely to reduce fuel tax revenues. The same is true for road user charges in general (i.e., fuel taxes, parking levies, commercial parking sales taxes, vehicle levies and tolls) because in each case the revenues vary roughly in proportion to how much people drive.<sup>211</sup>

Increasing road user charges is also likely to curb sales tax revenues through reductions in household income available to purchase other goods. Similarly, hikes in either sales or property taxes leave households with less money for driving so that revenues from road user charges will decrease. This type of “competition” between revenue sources exists even if funding instruments are introduced at low levels. For example, as explained in Appendix B, revenues from a new road toll will be partially offset by lower revenues from fuel taxes and parking taxes. Thus, the total revenue collected from a portfolio of funding

211 For example, Proost and Sen (2006) consider a setting where a regional government controls a cordon toll and a city government controls a parking fee in the city centre. An increase in the toll reduces parking fee revenues, and an increase in the parking fee reduces toll revenues.



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instruments is less than the sum of its (independent) parts.<sup>212</sup> There may be some benefit from choosing a balanced portfolio of instruments in terms of greater reliability and predictability of yield although the revenues from most instruments tend to move up and down together with the state of the economy.<sup>213</sup>

Quantifying the trade-offs between the amounts of revenue derived from multiple funding sources is difficult, both analytically and in terms of data requirements, and there has not been much research on it. De Borger (2001) examined the coordinated use of vehicle ownership taxes and usage charges in internalizing road-transport externalities and raising revenues. Parry and Bento (2002) examined how the benefits from road congestion charges are affected by the presence of other distortions such as pollution and inefficiently priced transit service. Both these studies were mainly concerned with correcting transportation externalities rather than with generating revenues.

In a study that more closely parallels this report, Parry (2002) developed an analytical framework for determining the most efficient way to raise a given amount of revenue for transportation infrastructure. Parry used the model to determine how to raise \$500 million per year in local revenue for metropolitan Washington, D.C. from five revenue sources. In order of decreasing efficiency he found they ranked as follows: a new congestion tax, the gasoline tax, the property tax, transit fares, and the labour income tax. The costs of economic distortions created by the congestion tax, the property tax, and the labour income tax were approximately constant (i.e., independent of the revenue generated). By contrast, the economic costs of the gasoline tax and transit fares rose sharply with the revenue yield because of their much smaller base.

It would be worthwhile to conduct a similar assessment of funding instruments for The Big Move in the GTHA. The results are likely to differ somewhat from what Parry obtained for Washington, D.C. because of differences between the two regions in the road network, the characteristics of transit service, fuel tax levels, and other properties of the tax system.<sup>214</sup>

212 Revenues are not subadditive in all cases. For example, transfers from senior levels of government are independent of revenues from local sources, at least in the short run. And revenues from road user charges and transit fares are mutually reinforcing because driving and public transit are substitute modes of transport for most trips (Park and Ride trips are one important exception).

213 Road user charges and transit fares may be an exception; see the preceding footnote.

214 One notable difference is that a network of HOT lanes is being built in Washington, D.C. Another is that mortgage payments are tax-deductible in the United States, but not Canada. Mortgage-deductibility in the United States makes a property tax more attractive because it offsets the bias towards home ownership.

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## 8.2 Recommendations for funding instruments

A number of funding instruments were reviewed in Sections 3 to 6 of this report and evaluated against the six public finance criteria identified in Section 2. Broadly speaking, by most criteria (see also Table A1) user charges rank above instruments that are only indirectly related, or not related, to usage of transportation infrastructure and services. For this reason, user charges are foremost in the recommendations of this report. Several other instruments also deserve consideration as additional funding sources to boost revenues without imposing serious economic inefficiencies or unfair burdens. User charges and other instruments are considered in turn.

### Transit fares

As explained in Section 3.2, transit fares are consistent with the benefits or user-pay principle. Charging fares can also be justified on efficiency grounds because riders impose wear and tear on transit systems and they impede or delay other users during peak periods. However, according to second-best pricing rules, fares should not cover full system costs because transit service has scale economies and automobile trips are underpriced. Fare revenues in the GTHA presently cover 70-80% of operating costs which is high by North American standards. Raising fares to boost revenues further would probably be counterproductive except, perhaps, if road pricing were implemented along the same travel corridors. However, fares in the GTHA are inefficiently structured because they do not vary either according to distance traveled (except for GO Transit) or when trips are taken. Transit passes exhibit both these problems. Aligning fares more closely with marginal costs would improve efficiency of transit usage. This leads to:

**Recommendation 1:** Transit fares should be based on distance traveled and time of use. A zonal scheme with peak/off-peak fare differentiation would be a reasonable compromise between strict adherence to marginal-cost pricing rules and ease of comprehension and use for riders. Implementing such a fare structure would be facilitated with the Presto fare-card system. Average transit fares should not be increased unless, perhaps, road pricing is introduced along the same travel corridors or on a wide scale.

### Parking policies

Two parking-related funding instruments were considered in Section 4: a commercial parking sales tax, and a parking levy. Reasons were also given for reforming the structure of on-street and off-street parking fees by varying fees by time of day, duration of stay, and demand conditions to reduce the amount of time spent searching for parking, and to ration parking space more efficiently generally.

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Restructuring parking fees is worth pursuing independently of revenue generation goals, and whether or not a parking sales tax or levy is introduced. A detailed study of parking in the GTHA should be carried out before specific plans are made. Innovative parking schemes have been implemented in other cities, notably the *SFpark* program in San Francisco, that offer valuable guidance on how to proceed.

**Recommendation 2:** On-street and off-street parking fees should be restructured to support more efficient usage of parking space. On-street parking fees should be based on occupancy rates in order to minimize time spent searching for parking while maintaining reasonably high utilization rates of parking space. Maximum-stay regulations should be replaced by escalating hourly rates in order to encourage parking space turnover while minimizing inconvenience on parkers and effort devoted to enforcement and fine administration. The Toronto Parking Authority can implement such measures within the City of Toronto. To control risks, implementation could begin with a limited-scale trial with expansion to follow conditional on successful experience.

Commercial parking sales taxes and parking levies are viable candidates for generating revenues. Both instruments control automobile usage, and each has its strengths and weaknesses. Both instruments are more effective in generating revenues, as well as in controlling parking and road congestion, if implemented on a broad geographical scale. A parking levy has a greater revenue potential than a sales tax because it applies to both commercial and non-commercial (i.e., unpaid) parking. But a parking levy requires an inventory of parking spaces to be created, and it is less effective in controlling driving.

**Recommendation 3:** The GTHA should consider implementing either a commercial parking sales tax or a parking levy. Responsibility for either measure could be granted to each municipality in the GTHA, or to the two cities and four regions in the GTHA, or to a governing body such as Metrolinx. However the commercial parking sales tax or parking levy is administered, tax rates or levies should be coordinated to avoid significant differences between municipalities that would encourage wasteful diversion of traffic and parking activity across municipal boundaries to take advantage of lower rates.

### Road pricing

As explained in Section 5, road pricing can be implemented in various ways and at different scales. The best choice depends on a number of considerations including the goals of pricing, the topology of the road network, infrastructure costs, legal constraints, governance and so on. Small-scale schemes have some advantages: they are cheaper and

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quicker to implement, errors are less costly, and lessons learned can be exploited later if/when tolling is expanded. The main drawbacks are that the revenues and efficiency gains are limited, and investments in toll collection infrastructure and software may be rendered useless or technologically obsolete if a different type of scheme is implemented later. Successful tolling schemes elsewhere provide valuable guidance for application in the GTHA, but they should not simply be treated as templates to copy because local circumstances differ in many ways from those elsewhere.<sup>215</sup>

As argued above with respect to parking fee reform, specific recommendations on road pricing in the GTHA should be deferred until the options are studied in detail. Nevertheless, some options appear less suitable than others. For several reasons, neither a cordon toll around the downtown nor a zonal charge is well-suited for the GTHA. First, congestion delays are prevalent throughout the region rather than being concentrated in the city centre as in London, Stockholm and some other European cities. Second, due to the grid structure of the downtown road network area-based schemes would require numerous tolling points and screenlines which would raise system costs.<sup>216</sup> Third, tolling only the city centre might discourage travel to the centre – with negative long-run land-use implications. Fourth, tolling local roads might invoke greater opposition than tolling more prominent or clearly congested arteries such as bridges and major highways.

One small-scale option is to introduce HOT lanes. Ontario's HOV Lane Network Plan calls for a 450-kilometre network of HOV lanes to be built on 400-series highways by 2031. The network could instead be built as HOT lanes. The Province could unilaterally implement the plan. The tolled infrastructure would be new, and it would offer drivers a choice between paying a toll for a quicker trip and using the existing toll-free lanes. The network would also be large enough that many trips could be driven mainly on HOT lanes with substantial gains from shorter and more predictable travel times.<sup>217</sup> HOT lanes have less revenue potential than more broadly-based road pricing schemes because of the limited number of lane-kilometres they cover and because motorists have a ready

215 Hamilton (2011) provides a cogent discussion of this point from the perspective of the Stockholm Congestion Tax.

216 Due to the sparse road network in Stockholm, and the bodies of water surrounding it, the Stockholm toll cordon has just 18 toll stations. The road network in Gothenburg is denser, and although the city is smaller than Stockholm the Gothenburg toll cordon that commenced operation on 1 January, 2013, has 40 toll stations.

217 These and other advantages of the HOT-lane option for Toronto are described in Lindsey (2008) and Dachis (2011). Finkleman, Casello and Liping (2011) find public support for HOT-lanes in the GTHA.

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alternative: to use the toll-free lanes on the same highway.<sup>218</sup> But the fact that there is a choice is also an advantage in terms of public acceptability. Another advantage is that, as U.S. experience has shown, HOT lanes show drivers the benefits that tolling can bring. In this way HOT lanes can help to change attitudes towards road pricing and “pave the way” for other forms of tolling.

In principle, existing HOV lanes in the GTHA could also be converted to HOT. These lanes do not operate close to capacity during much of the day, and they could accommodate some additional vehicles without a drop in speeds. However, retrofitting the lanes with toll collection infrastructure would be disruptive and expensive. One option would be to adopt an “honour” system using a monthly tag or day-pass rather than a transponder. This might avoid the need for electronic monitoring and enforcement. HOV usage could also be enhanced by opening access to more vehicle types. Many commercial vehicle users would be willing to pay for access, but trucks over 6.5 metres long are currently prohibited because of their size and potentially low speed. Restrictions could be eased if HOV/HOT infrastructure were expanded to two lanes in each direction.

A second, larger-scale, option is to toll 400-series highways in the GTHA, and possibly also major regional and municipal roads. Ontario’s Ministry of Transportation—Ontario can introduce tolls on provincial highways without consulting other parties. Metrolinx is legally empowered to toll municipal roads. But a special regulation is required, and because of junctions between municipal and provincial roads the Ministry and Metrolinx would have to coordinate for the overall system to work well. In particular, care would be required to limit traffic diversion – especially of heavy vehicles onto alternate routes that are not built to adequate standards.

For either HOT lanes or highways it is desirable to vary tolls by time of day in order to dampen congestion at peak times. Varying tolls by time of day is also conducive to revenue maximization because motorists are willing to pay more for quicker trips. Variable pricing is standard practice on HOT lanes in the United States, and it is increasingly common on highways around the world. Peak and off-peak tolls are used on Autoroute 25 expressway in Montreal. Highway 407 (which is privately operated) applies four toll levels over the course of the week. Time-varying tolls are also used for the Stockholm congestion tax and for electronic road pricing of arterials and expressways in Singapore.

218 The revenue potential of HOT lanes can be increased by tightening the requirements for HOV vehicles so that more capacity is available to accommodate toll-paying users. One possibility would be to increase the occupancy requirement from HOV2 to HOV3 which is the standard in Toronto.

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**Recommendation 4:** Road pricing using time-varying tolls is the most attractive funding scheme for the GTHA in terms of adhering to the user-pay principle, economic efficiency, consistent and sustainable revenue yield, and equity. The two most promising options are: (1) a network of HOT lanes, and (2) tolling all lanes on 400-series highways and possibly major regional and municipal roads. Both options should be energetically pursued. HOT lanes are the smaller-scale and less-risky option, but it will take time to build out the network. HOT lanes also have less revenue potential than more broadly-based road pricing schemes. Tolling highways should begin either after part of the HOT lane network is up and running, or at the same time.

In the longer run, comprehensive distance-based road pricing may become the best option for the GTHA. To be economic, it would require use of GPS technology. GPS-enabled distance schemes for passenger vehicles have been extensively tested in the United States, and implementation in the GTHA (or other Canadian cities) could follow a successful U.S. lead. Experts are divided as to whether GPS systems should be used for congestion pricing, parking pricing and various other functions, or whether they should be limited to revenue generation.<sup>219</sup> The impetus behind distance-based in the United States is revenue generation, and it could be used for the same purpose in Canada.

### **Other funding instruments**

In combination, a regional parking levy and some form of comprehensive road pricing might yield enough revenue to fund The Big Move. If not, one or more of the other funding instruments reviewed in this report should be considered. Leading candidates are a regional fuel tax, a vehicle levy and a regional sales tax (cf. Section 6). A fuel tax is ideal for internalizing the costs of greenhouse gas emissions. It is a blunt instrument for controlling congestion, but that is not a limitation if pricing of parking and roads are improved as recommended. A vehicle levy is simple to collect and administer, and the City of Toronto has experience with the recent Personal Vehicle Tax. A vehicle levy throughout the GTHA would raise several times as much revenue. A regional sales tax is not directly related to travel, but that is not a serious drawback if efficient usage-related instruments are also implemented. The main strengths of a regional sales tax are its large revenue potential and the fact that it is paid by commuters and visitors as well as residents. Because of its broad base, and relatively low level (e.g., 1%), a sales tax could be seen as a fair way for everyone to contribute toward a good regional transportation system.

219 See Grush (2012a) for an example of the first view and Poole (2012) for the second.

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To introduce a regional fuel tax, a region-wide vehicle levy or a regional sales tax, either a new governing body for the GTHA would be required or existing institutions would have to be given new powers. Collection and administration of the tax or levy could be piggybacked onto the corresponding existing tax (provincial fuel tax, vehicle registration fee and provincial sales tax). The governing body should be responsible for setting the rate and spending the revenues. A new regional government might be best in principle, but one is unlikely to emerge in the near future. An alternative is to grant Metrolinx with the enhanced powers with directly elected politicians.

**Recommendation 5:** Consideration should be given to implementing a regional fuel tax and/or a vehicle levy and/or a regional sales tax in the GTHA. The governing body would be responsible for setting the rate and spending the revenues. To reduce costs, a collection and administration levy could be piggybacked onto the corresponding existing tax.

### 8.3 Implementation and public acceptability

Whatever the set of funding instruments adopted to fund The Big Move, it will be necessary to decide how quickly to introduce them and in what order. Identifying an optimal implementation path for efficient transportation pricing and investments is recognized as a difficult problem.<sup>220</sup> Some instruments such as advanced road-pricing schemes may be deferred for several years, whereas others such as a regional sales tax may be used initially but phased out later when the need to finance new investments has diminished.

Gaining public and political support to introduce new funding instruments and expand existing ones is essential for any plan to succeed. Experience with road pricing around the world offers several lessons. One is that any scheme should have a clear and publicly stated objective. Pursuing multiple objectives is attractive from a system-optimization perspective, but it is liable to create confusion. One reason why the cordon toll proposed for Edinburgh was soundly rejected is that it was unclear whether it was intended primarily to relieve congestion or to raise revenue for public transit.<sup>221</sup> By contrast, the London and Stockholm schemes were designed for congestion pricing from the start, and they were clearly and consistently marketed to the public as such.<sup>222</sup>

220 de Palma, Lindsey and Niskanen (2006) and Verhoef et al. (2008).

221 Gaunt, Rye and Ison (2007).

222 The new cordon toll in Gothenburg is very similar in structure to the one in Stockholm. Yet, in addition to reducing congestion (which is less severe than in Stockholm) the Gothenburg toll is intended to reduce emissions and to raise revenue for major road, rail and public transport investments. The Gothenburg scheme thus appears to violate the rule of pursuing simple goals.



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The impetus behind road pricing in the GTHA has shifted over time from congestion relief to the environment and then to funding.<sup>223</sup> It is important that future initiatives, which may involve multiple instruments, be designed and marketed with a consistent objective. For instruments such as the property tax and a regional sales tax it is clear that funding is the goal. But for tolls and other instruments such as parking fees and fuel taxes, the objective is not so obvious. To be consistent, funding should be identified as the main purpose for the whole package.<sup>224</sup> Congestion relief, fewer accidents, cleaner air, and so on can be identified as supplementary benefits when defending the plan.

A second lesson from international experience with road pricing is that the public should be engaged at all stages of implementation through consultation, focus groups, and other media. The key role played by Ken Livingston in implementing the London Congestion Charge while he was mayor demonstrates that a political champion is helpful for bringing in controversial measures. In principle, a political party or an institution could play the role of champion instead of an individual. A third lesson, discussed in Section 7.3, is that revenues should be dedicated to local transportation and ring-fenced in such a way that other revenues are not reduced in an offsetting manner. Good public transport is considered highly desirable – if not essential – if measures are introduced to make driving or owning vehicles more expensive. In this respect the GTHA faces a chicken-and-egg problem. It needs new revenues to expand public transit (and improve roads), but it needs to have the improvements in place to convince the public that new revenue measures are required. Dedicating revenues goes some way toward resolving this problem.

**Recommendation 6:** A funding plan should be designed and presented to the public with simple, consistent objectives. The revenues should be dedicated to specific projects and ring-fenced in such a way that other revenues are not reduced in an offsetting manner. To the extent possible, public transit investments should be expedited, and the effects on modal shares and travel times regularly measured and publicly reported to demonstrate progress.

223 Grush (2008).

224 Funding is easier to explain to the public than congestion relief, which has subtle aspects that can easily lead to misinterpretations and arguments.

## APPENDIX A: SUMMARY ASSESSMENT OF REVENUE INSTRUMENTS

**Table A1: Strengths and weaknesses of revenue instruments**

	Strengths	Weaknesses	Annual Revenue Potential	Responsibility
Commercial Parking Sales Tax	Transparent, easy to implement, fairly predictable revenue. Impacts depend on: whether tax is ad valorem or fixed; how much of tax is passed on; how travelers adjust their behaviour.	Applies only to off-street commercial parking. Discriminates against commercial parking. May divert business away from dense areas.	\$50 - 60M from 15% tax	Municipalities or regional
Parking Levy	Flexible in incidence & rate differentiation. No need to monitor parking activity. Fairly predictable revenue.	Invisible to users & unrelated to usage. Applies only to off-street parking. Requires parking space inventory. Failed experiences in Toronto & Vancouver.	Depends on coverage. \$1B+ from \$1.00/day charge in whole region.	Municipalities or regional
Reforming Parking Fees	Reduces cruising for parking & walking distance to destination. Reduces enforcement & parking fine administration.	Requires changes in regulations & institutional practices. Smart meters are costly.	Depends on location & implementation details. Revenues will probably rise.	Municipalities
High Occupancy Toll (HOT) lanes	Provide drivers with choice whether to pay. Infrastructure is relatively cheap.	Limited potential to reduce congestion & pollution regionally.	\$300-\$600M	Province

**Table A1: Strengths and weaknesses of revenue instruments (Cont.)**

	Strengths	Weaknesses	Annual Revenue Potential	Responsibility
Highway Tolls	<p>Large potential gains from congestion relief.</p> <p>Technology is widely used.</p>	<p>Traffic diversion to untolled substitutes.</p> <p>Driver opposition.</p>	<p>Don Valley Parkway &amp; Gardiner Exwy @5/10c/km: \$74-120M.</p> <p>All 400-series hwys@7c/km: \$700M. All hwys@10c/km: \$1.5B.</p>	Province or regional
Cordon or zonal road pricing scheme	<p>Large potential gains from congestion relief &amp; measurable reduction in pollution.</p> <p>Works well where implemented.</p>	<p>High infrastructure cost. Not well-suited to dispersed congestion in GTHA. Crude spatial variation of toll dilutes efficiency &amp; creates horiz. inequities.</p>	<p>Not studied for Toronto.</p> <p>Net revenues elsewhere: Stockholm \$90M; London \$240+M.</p>	Regional
Comprehensive distance-based road pricing	<p>Large revenue potential.</p> <p>Largest potential benefit from congestion relief &amp; pollution reduction.</p>	<p>Very costly to implement using conventional gantries. Cheaper with satellite-based system, possibly following US lead.</p>	<p>Not formally studied anywhere in Canada.</p>	Province
Regional fuel tax	<p>Ideal for internalizing costs of greenhouse gas emissions.</p>	<p>Blunt instrument for controlling congestion.</p> <p>Avoidable by purchasing fuel outside region.</p>	<p>\$50M for tax of \$0.02/litre.</p>	Regional

**Table A1: Strengths and weaknesses of revenue instruments (Cont.)**

	Strengths	Weaknesses	Annual Revenue Potential	Responsibility
Vehicle Levy	<p>Simple to collect &amp; administer.</p> <p>Relatively stable &amp; predictable revenue source.</p>	<p>Unrelated to vehicle usage.</p> <p>Motorists living outside region escape payment.</p> <p>Unfair unless dedicated to local transport.</p>	<p>Personal Vehicle Tax (2008-2010) in Toronto raised \$50M.</p>	<p>Regional or Municipal</p>
Regional Sales Tax	<p>Unlike property tax, it is paid by commuters &amp; visitors as well. Broadly based &amp; large revenue potential.</p> <p>Closer link to travel than property tax.</p>	<p>Not directly related to travel.</p> <p>Requires enabling legislation.</p>	<p>\$1B from 1% increase in HST in GTHA.</p>	<p>Regional</p>
Public-private Partnerships	<p>Potential cost savings, tap strong operational knowledge &amp; operational flexibility.</p> <p>User charges possibly more acceptable than for public projects.</p>	<p>Significant transactions costs.</p> <p>Requires quality monitoring &amp; regulation if project includes operations &amp; maintenance.</p> <p>Risks must be allocated appropriately between partners.</p>	<p>Revenue potential derives from cost savings. Depends on type &amp; scale of project. Potential cost overruns &amp; changes in specifications can create substantial uncertainty.</p>	<p>Regional or municipal with technical support from Infrastructure Ontario.</p>

Source: Authors' construction. M = million. B = billion.

## APPENDIX B: NET REVENUE GAIN FROM FUNDING INSTRUMENTS

In this appendix a simple, aggregate, travel demand function is used to illustrate how the net revenue gained from an automobile user charge or tax can be estimated when more than one revenue source exists. Demand for automobile travel is assumed to depend on the so-called “generalized cost” or “full price” of a trip. The full price includes all variable monetary and non-monetary costs of travel: fuel consumption, tire wear, vehicle maintenance, parking fees, toll payments and the value or opportunity cost of the driver’s (and any passengers’) time.<sup>225</sup> Let  $p$  denote the full price,  $c$  the cost of tires and maintenance,  $p_f$  the retail price of fuel,  $p_k$  the consumer price of parking (i.e., including taxes),  $\tau$  toll expenditures, and  $w$  the cost of time – all expressed in cents per kilometre. The retail fuel price consists of the producer price,  $q_f$ , plus provincial & federal taxes,  $t_f$ . Similarly, the consumer price of parking consists of the resource or supplier price of parking,  $q_k$ , and taxes,  $t_k$  (commercial sales tax). The full price is therefore

$$(1) \quad p = c + w + p_f + p_k + \tau = c + w + (q_f + t_f) + (q_k + t_k) + \tau.$$

Let  $D(p)$  denote the aggregate regional demand for travel measured in total vehicle kilometres. Aggregate revenues from the fuel taxes, parking taxes and tolls are

$$(2) \quad R = (t_f + t_k + \tau)D.$$

Using calculus it is straightforward to show that the incremental or marginal revenue,  $MR$ , derived from a small increase of  $\Delta$  in any one instrument (fuel tax, parking tax or toll) is

$$(3) \quad MR = \Delta \left( 1 + \frac{t_f + t_k + \tau}{p} \varepsilon \right) D = \Delta \left( 1 + \frac{t_f + t_k + \tau}{c + w + q_f + q_k + (t_f + t_k + \tau)} \varepsilon \right) D,$$

where  $\varepsilon$  is the elasticity of travel demand with respect to the full price.<sup>226</sup> Since  $\varepsilon < 0$ , the term inside brackets in equation (3) is less than one. The fraction inside brackets is less than one because the term  $t_f + t_k + \tau$  appears in both numerator and denominator and the denominator has additional terms. Equation (3) indicates that the marginal revenue gained from a tax or toll increase of  $\Delta$  is less than  $\Delta$  multiplied by  $D$  if any of the tax rates,  $t_f$ ,  $t_k$  or  $\tau$ , is positive.

225 Small and Verhoef (2007) describe the generalized cost approach in Chapters 3 and 4, and the value of time in Section 2.6.

226 The elasticity is calculated using the formula  $\varepsilon = (dD/dp)/(p/D)$ , where  $d$  denotes a derivative.

Some illustrative parameter values are given in Table B1. The cost of parking is set to zero because drivers do not currently pay for parking on most trips in the GTHA. Similarly, the toll is set to zero because tolls are levied only on Highway 407. The time cost is computed using a value of time of \$15/h and an average speed of 50 km/h.<sup>227</sup>

**Table B1: Parameter values for marginal revenue calculation**

Component of generalized cost	Value [cents per km.]	Source
Tire and maintenance cost, $c$	6.56	CAA (2012)
Time cost, $w$	30 .00	See text
Retail fuel price, $p_f$	10.12	CAA (2012)
Supplier fuel price, $q_f$	6.94	0.69 of retail price
Fuel tax, $t_f$	3.18	0.31 of retail price
Consumer price of parking, $p_k$	0	
Supplier price of parking, $q_k$	0	
Parking tax, $t_k$	0	
Toll, $\tau$	0	
Long-run elasticity of travel demand, $\epsilon$	-1.0	Litman (2012, p.48)

Using the values in Table B1, the bracketed term in equation (3) works out to 0.932. This implies that slightly raising the level of one of the funding instruments induces a slight reduction in driving that causes the revenue gained to be about 7% lower than if the amount of travel did not change. This discrepancy is relatively small. However, it would be larger if fuel taxes were increased (higher  $t_f$ ), a parking sales tax were imposed (positive  $t_k$ ) or if tolls were introduced (positive  $\tau$ ). For example, if comprehensive highway tolls were imposed at a rate of 10 cents/km as considered by the City of Toronto (2012), the term inside brackets in equation (3) would fall to 0.768. The net revenue gained from fuel taxes and the toll combined would then be overestimated by about 23% if the reduction in travel were ignored.

<sup>227</sup> The \$15.00/h value of time is a rough average of the values of time used in Transport Canada (2006a) for work-related trips and non-work related trips.

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The simple travel demand function approach used in this appendix is illustrative only, and the numerical results should not be taken too seriously. One limitation of the approach is that it assumes travel in the GTHA can be described by a single aggregate demand function. Another limitation is that it treats each component of the generalized cost as fixed. In practice, drivers may be able to avoid parking fees or tolls by changing their routes or trip destinations. Avoidance is easier, of course, if parking fees or tolls are implemented only locally than if they are applied across the whole region. In the long run, drivers can also reduce fuel tax payments by buying fuel-efficient vehicles or switching to hybrid or electric models. Such adjustments increase the magnitude of the elasticity of demand,  $\epsilon$ , and further undermine the net revenue gained from an increase in user charges or taxes.



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The Residential and Civil Construction Alliance of Ontario (RCCAO) is composed of management and labour groups that represents a wide spectrum of the Ontario construction industry. The RCCAO's goal is to work in cooperation with governments and related stakeholders to offer realistic solutions to a variety of challenges facing the construction industry and which also have wider societal benefits. For more information on the RCCAO or to view copies of other studies and submissions, please visit the RCCAO website at [www.rccao.com](http://www.rccao.com)

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